内容提要

"口腔临床要点快速掌握系列"是国际著名的Quintessence出版集团近期出版的介绍口腔各科基本技术和最新医学理论的专业丛书。该丛书自2002年起陆续出版发行，我社第一时间引进，以便国内读者同步了解国际口腔技术发展的新情况。本书由国际知名口腔医学专家编写，摆脱了一般专著的照本宣科，一切从临床实践出发，通过大量实例，讲解了可摘局部义齿的最新理论和最基本、最重要、最实用的操作技术。本书采用了中英对照的编排方式，对提高读者的专业英语水平也大有裨益。本书适合于临床口腔科医师、技师和口腔医学生阅读。

责任编辑 杨 淮 韩 志

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序

能够在可摘局部义齿修复学方面取得成功，不但使我们成为一名真正的实践操作者，而且还令人倍感满足。然而，可摘局部义齿修复学的知识和技巧却是复杂和充满挑战性的。正如这套深受欢迎的“口腔临床要点快速掌握系列”中所强调的，可摘局部义齿的成功取决于对许多必要的基本原则的坚持：正确的诊断，包括了解患者的需求和期待；对现存技术和材料性能的掌握和了解；合理的计划和对细节的关注。同样重要的还包括在开始修复缺失牙之前，控制和处理活跃的口腔病变，这也正是本书作者非常强调的一个原则。

关于实践操作，本书给从业医师提供了以证据为基础的行为准则，可以直接应用于每天的临床实践。尤其值得关注的是，本书针对局部义齿的设计提出了合理的、易于掌握的和令人耳目一新的操作方法。如果希望可摘局部义齿让患者满意和接受，还不用说使用良好，那么义齿的设计就是从业医师必须完成的一个重要步骤。如果怀疑你做的许多可摘局部义齿，尤其是那些下颌游离端鞍基义齿会被患者闲置得太久，或者更糟，被患者扔在了某个卫生间橱柜的背后或是家里的其他黑暗角落，那么，你就应该认真阅读此书。如果要为患者制作可摘局部义齿，那么就应该把它们做好，这就是本书的动机。

正如你所期待的，作为“口腔临床要点快速掌握系列”中的一册，本书配以高质量插图，进行了深入阐述，达到了很高的水准。很少有其他书籍能像本书一样，仅需一两个晚上就可以读完，但却提供了如此之多的关于可摘局部义齿的信息。你的可摘局部义齿患者将会非常高兴地知道，这本书已成为你职业继续教育的一部分。

主 编 **Nairn Wilson**

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前　言

可摘局部义齿可以定义为：用于恢复位于尚存部分天然牙牙弓上的缺失牙和相关支持组织的活动修复体。它是修复患者缺失牙齿外观和功能的方法之一，并且有充分的证据来支持其长期应用的成功性。

就材料和技术而言，近年来可摘局部义齿的临床应用改进不大。改变明显的是这种应用的背景以及我们对应用效果的理解。重要的、持续的局部缺牙人口统计学改变，对修复缺失牙可选择方案的增多，以及不断增加的表明长期有效的证据，正在显著地影响着它们的应用。本书回顾了这些影响，并且用实例回顾了制作可摘局部义齿系统的、有效的方法。

阅读收获

期望读者在读完本书后能够：

- 认识到局部缺牙人口的统计学改变，重视可摘局部义齿的效果和应用后果。
- 理解适合应用可摘局部义齿的临床和患者相关因素，认识到可摘局部义齿设计要基于患者期待的美观和功能需要。
- 认识到并非所有缺失牙齿都需要修复，知道为患者制定功能导向治疗计划的概念。
- 理解可摘局部义齿设计的基本原则，并且把这些原则应用到可摘局部义齿相关组件的设计中去。
- 了解观测模型的步骤，以及如何将其应用到一个简单、实用的局部义齿设计过程中去。
- 知道可摘局部义齿的设计是从业医师的职责。
- 了解制作可摘局部义齿的材料和临床技巧。
- 理解过渡性局部义齿的适应证和类型。

Nicholas J A Jepson

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致 谢

感谢Dean Barker先生、Bengt Öwall教授、David Smith先生和Richard Tones先生允许我在文中引用他们的部分图片。也要感谢我过去和现在的许多同事、患者和学生，他们帮助我形成了对局部缺牙情况总的处理原则，尤其是应用可摘局部义齿的观点。

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目 录

第 1 章　可摘局部义齿概述　(1)
第 2 章　可摘局部义齿的适应证　(20)
第 3 章　可摘局部义齿设计的基本原则　(38)
第 4 章　可摘局部义齿的设计：鞍基、支托和固位体　(53)
第 5 章　可摘局部义齿的设计：连接体　(79)
第 6 章　观　测　(97)
第 7 章　过渡性可摘局部义齿　(116)
第 8 章　临床指导 I：收集信息　(136)
第 9 章　临床指导 II：确定义齿的设计　(154)
第 10 章　临床指导 III：可摘局部义齿的口内预备　(168)
第 11 章　临床指导 VI：可摘局部义齿的完成和维护　(188)

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第 1 章 可摘局部义齿概述

Partial Denture Provision

目 的

在工业化国家里，随着口内仍然存有部分天然牙齿的老年人比例增高，人们对于义齿修复的要求也会增加。本章旨在概述用以修复成人牙列缺损的可摘局部义齿。

要 点

阅读本章后，从业医师应当了解可摘局部义齿的疗效及预后。

牙列缺损人群

在许多发达国家中进行的全国口腔健康调查结果清楚地表明，无牙颌人群的比例将持续下降，更多的人群在步入老年以后仍将保留一些自体牙齿。1998 年的英国全国健康调查结果显示，87%的成年人口内余留有天然牙，但这个比例受年龄因素的影响很大。在一些发达国家中各个年龄组人群的平均失牙数见图 1–1，资料源自

Aim

In industrialised countries, as the proportion of adults retaining some of their teeth into old age increases, so will the likely need for prosthetic intervention. This chapter aims to provide an overview of the need and demand for partial dentures to restore partially dentate adults.

Outcome

After reading this chapter the practitioner should be aware of the effectiveness and consequences of partial denture use.

The Partially Dentate Population

Evidence from various national dental health surveys in developed countries clearly indicates that the proportion of people with no teeth at all will continue to decline and that more people will retain some of their own teeth into old age. The results of the 1998 national dental health survey in the UK indicate that 87% of all adults had some natural teeth but that this

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瑞典WHO合作中心（2003年）。其共同的趋势是在45岁以后人群中才出现明显的牙缺失，并且失牙数随年龄的增加而增多。45岁以上（含45岁）人群的可摘局部义齿使用率在不同的国家有所不同，但都能达到20%～30%的水平。这种区别反映了在不同国家里公众及专业人员对可摘局部义齿使用的不同态度以及保健体系的不同。在将可摘局部义齿作为牙列缺损患者常规治疗方案的地区，决定是否采用可摘局部义齿修复的重要因素是余留天然牙的数量。1998年英国的口腔健康调查结果明确显示21～24颗牙是个分界点。有21颗或更多牙齿的患者不大可能使用可摘局部义齿（图1-2）。这也支持了"功能性牙列"这个重要概念：认为患者不需要修复失牙也可以获得足够的功能和舒适度。

proportion was strongly influenced by age. The mean number of missing teeth by age group for a number of developed countries is shown in Fig 1-1 using data from the WHO Collaborating Centre, Sweden (2003). Common trends are that significant tooth loss only becomes apparent after 45 years of age and that the number of missing teeth increases with age. The percentage of people ≥ 45 years of age provided with partial dentures differs between countries, a variation that reflects both differing public and professional attitudes to partial denture use and healthcare systems, but can reach levels of 20–30%. Where provision of partial dentures is a commonly used treatment option for the partially dentate, the principal deciding factor as to whether or not a partial denture is used appears to be the number of remaining natural teeth. Results of the 1998 UK Dental Health Survey clearly indicate that there is a cut-off point at 21–24 teeth and people with 21 or more teeth are unlikely to have removable partial dentures (Fig 1-2). This supports the important concept of a "functional dentition" which allows the patient sufficient function and comfort without the need for tooth replacements.

人们口内余留牙齿的数目也有增加。1998年在英国，超过72%的成人有21颗或者更多牙齿。虽然这一数据随着年龄增加而降低，如在75岁以上

The number of teeth that people retain has also increased. In the UK in 1998, over 72% of adults had 21 or more teeth although this figure reduced with age such that only

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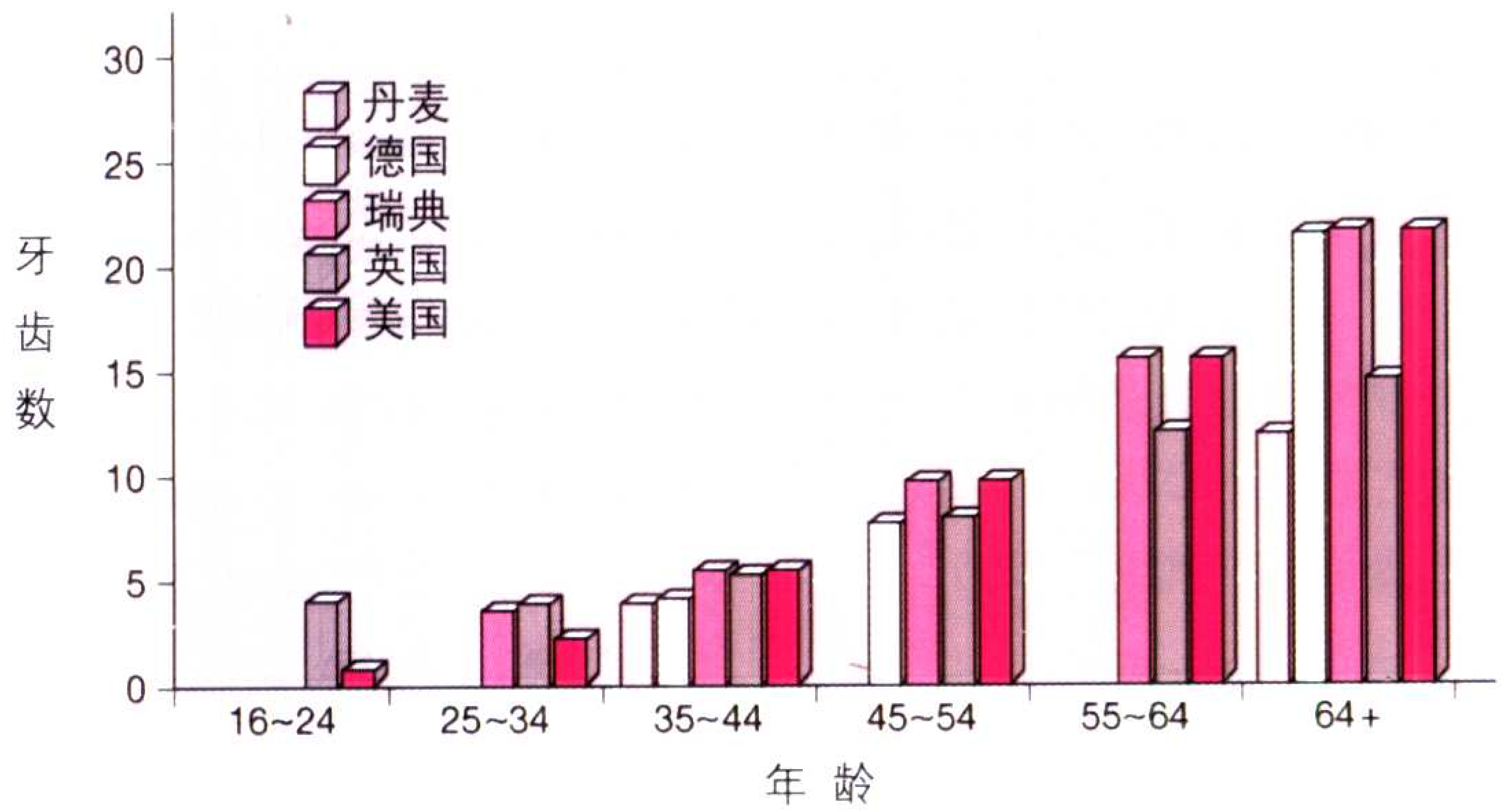


图 1-1　不同年龄组的平均失牙数目（数据来源于 2003 年瑞典 Malmö WHO 合作中心）

Fig 1-1　The mean number of missing teeth by age group (data from WHO Collaborating Centre, Malmö, Sweden 2003)

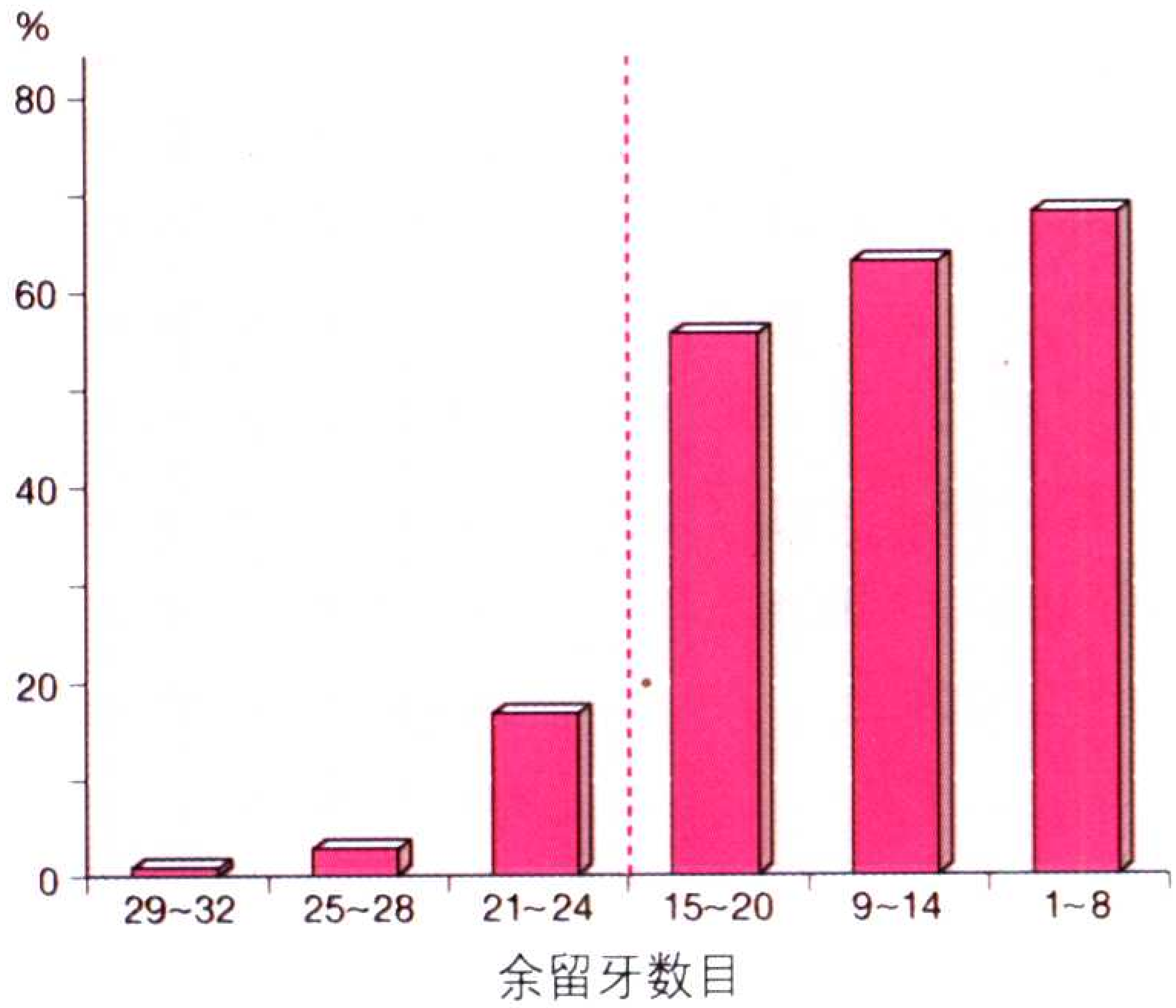


图 1-2　牙列缺损患者佩戴可摘局部义齿情况与余留牙数目的比例关系（成人牙科健康调查结果，1998 年的英国口腔健康状况）

Fig 1-2　The proportion of partially dentate adults with removable partial dentures by number of natural teeth (Adult Dental Health Survey, Oral Health in the United Kingdom 1998)

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（含75岁）的人群中其比例只有10%。预计到2018年，英国16～74岁人群中有90%将保留21颗或更多天然牙齿，虽然这一比例仍将随着年龄增长而降低。这些预计需要放在工业化国家里65岁以上（含65岁）人口比例不断增长、人口寿命持续上升的背景下去考虑。例如在英国，到2021年65岁以上成年人的数量可望增加到270万。

10% of people aged ≥ 75 years had 21 or more teeth. Projections for 2018 suggest that 90% of 16-74 year olds in the UK will have a natural dentition of 21 or more teeth though this proportion will again reduce with age. Such projections need to be seen in the context of increasing life span in industrialised countries with an increasing percentage of populations ≥ 65 years old. In the UK, for example, the number of adults over the age of 65 years is expected to rise by 2.7 million by 2021.

余留牙数目的增加反映了人们在维护牙齿健康方面更积极的态度，也反映了牙科保健方法的改进。成年人更加希望保留他们的天然牙，也更愿意接受口腔医师推荐的保留牙齿的治疗方案。这也很好地证明了牙科保健水平的提高增加了终生保留至少几颗天然牙的可能性。越来越多的成年人发觉无法接受使用全口义齿，但有趣的是，这种观点看起来似乎并不影响可摘局部义齿的使用。那么未来可能越来越多的牙列缺损的老年患者要求使用可摘局部义齿来修复缺牙了。

Increased tooth retention reflects the development of more positive attitudes to dental health and improved access to dental care. Adults increasingly wish to retain their natural teeth and are prepared to accept treatment recommended by their dentists to save their teeth. There is good evidence that dental attendance improves the possibility of retaining at least some teeth over the course of a lifetime. Increasingly, adults find the prospect of complete dentures unacceptable though, interestingly, such attitudes do not seem to apply to the use of partial dentures. The future then is one of increasing numbers of older partially dentate adults who may require partial dentures to replace missing teeth.

基于全国调查数据的预计已经被用于评估未来牙列缺损患者的治疗需求。这些评估指出固定修复和活动修复的需求都有所提高。在美国，预计到

Projections based on data from national surveys have been used to estimate the future treatment need for the partially dentate. These estimates point to an increased need

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2020年，固定修复和活动修复的需求总量将达到现有水平的115%。可摘局部义齿是修复缺失牙的最简单，最便宜，也是目前最常用的方法。在英国，约30%的中年人和老年人使用可摘局部义齿修复。然而，固定义齿正被越来越多的老年患者所接受，越来越多的人们也认为种植支持式义齿可能会为有部分缺牙的患者提供一种更有效、更持久的修复方案。但是，社会经济因素显示，可摘局部义齿仍将在可预计的未来更频繁地被使用。结合明显的人口趋势分析，未来在发达国家里，人们对可摘局部义齿的需求不会下降，而是可能维持相对稳定的状态。

for both fixed and removable prosthesis. In the USA the projected total need for fixed and removable prosthesis is put at 115% of current provision by the year 2020. Partial dentures are the simplest, cheapest and by far the most common method of replacing missing teeth. In the UK approximately 30% of all middle aged and elderly adults have been provided with partial dentures. There is, however, an increasing acceptance of the use of fixed prosthesis by elderly patients and a growing recognition that implant-supported prosthesis offer a viable and, perhaps, more effective long-term treatment alternative for the partially dentate. Socio-economic factors would suggest, however, that the more frequent use of partial dentures will remain the situation for the foreseeable future. This together with the evident population trends would suggest that the need for partial dentures in developed countries is unlikely to decrease in the future and will probably remain relatively stable.

可摘局部义齿的作用

在绝大部分病例中，可摘局部义齿通过修复典型的因前牙缺失造成的可见间隙来改善外观；或者通过修复缺失的后牙（通常是磨牙）来改善功能。此外，可摘局部义齿还被主张用于保持殆稳定。本节将探讨可摘局部义齿在这些情况下的使用效果。

The Effectiveness of Partial Denture Provision

For the very large majority of cases, partial dentures are provided to improve appearance by restoring visible spaces resulting from the loss of typically anterior teeth and to improve function by restoring missing posterior, usually molar, teeth. In

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addition, the use of partial dentures is often advocated to maintain occlusal stability. This section will review the effectiveness of partial denture use in these circumstances.

外　观

前牙缺失修复后获得的外观改善毋庸置疑（图1-3）。也许这就是患者要求可摘局部义齿修复而且继续戴用它们的原因，但这并非必然。有个很好的例子可以证明这一点，对于什么是令人满意的外观，口腔医师和患者的看法大相径庭（图1-4）。当然关键在于患者的意见。这与他们认为的社会环境可接受的形象、以及被社会学家称之为"过得去"的毫不拘束和可接受的概念有很大关系。患者的年龄似乎确实影响到外观对他们的重要性。年轻患者，对明显的牙齿缺失无法接受，这会有力地促使他们去寻求治疗。而许多年龄较大的患者会觉得存在可见的缺隙，如第一前磨牙缺失（图1-5），还是可以接受的。随着年龄的增长，人们对功能的关注超过了对外观的关注。

Appearance

The improved appearance gained by the replacement of missing anterior teeth really needs no amplification (Fig 1-3). It is probably the main reason patients request partial dentures and, perhaps, continue to wear them but this is not inevitably the case. There is good evidence to suggest that the dentist's and patient's view of what is or is not a satisfactory appearance can differ markedly (Fig 1-4). The key factor is, of course, the patient's opinion and this is strongly linked to what they perceive is an acceptable appearance in their social environment, a concept of social ease and acceptability well described by social scientists as "passing". The age of the patient does seem to influence the importance attached to appearance. For younger patients, the loss of visible teeth is likely to be unacceptable and a powerful driving force to seek treatment, yet many elderly patients can find the presence of visible spaces resulting, for example, from the loss of first premolar teeth quite acceptable (Fig 1-5). As age increases there appears to be a greater focus on the need for acceptable

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图 1-3　因前牙缺失造成的可见间隙似乎是患者寻求修复治疗的主要动机

Fig 1-3　The presence of visible spaces because of missing anterior teeth is likely to be the main factor motivating this patient to seek treatment to replace them



图 1-4　有些让人吃惊的是，患者坚持认为缺失的|2不需要修复

Fig 1-4　Somewhat surprisingly, the patient was insistent that the missing UL2 should not be replaced



图 1-5　很多年龄较大的患者觉得可见缺隙的存在是可以接受的

Fig 1-5　Many elderly patients find the presence of visible spaces quite acceptable

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function rather than appearance.

咀嚼功能

天然牙数量减少可能对咀嚼功能产生影响的经典描述 见图1-6。牙齿缺失，尤其是后牙缺失，会引起咀嚼和咬食困难——这就是咀嚼功能受限。咀嚼功能受限引起对食物的选择发生改变，摄取食物的不全面可能导致营养不良。对缺失牙进行修复能够恢复咀嚼功能，使患者在选择食物时有更大的自由，从而可能增加对食物的摄取。

Masticatory function

The classic description of the possible effects of a reducing number of natural teeth on masticatory function is shown in Fig 1-6. Tooth loss, in particular that of posterior teeth, results in difficulty chewing and biting food — that is a limitation of masticatory function. This in turn leads to changes in food choices, an impaired dietary intake that may be associated with nutritional deficiency. Replacement of missing teeth restores masticatory function and allows the patient more dietary freedom and the possibility to improve dietary intake.

多年以来，存在一个基本的假设：后牙的逐渐脱落会在一定程度上降低咀嚼效率，从而导致消化问题。事实上，也有证据表明，由于牙齿的缺失，咀嚼效能的客观测量结果降低了。但是也有许多有大量后牙缺失的患者很少或者根本没有抱怨他们咀嚼食物的

It was for many years a basic assumption that the progressive loss of posterior teeth would reduce chewing efficiency to the extent that problems of digestion would ensue. Indeed, there is evidence to suggest that as teeth are lost so objective measures of masticatory performance deteriorate.

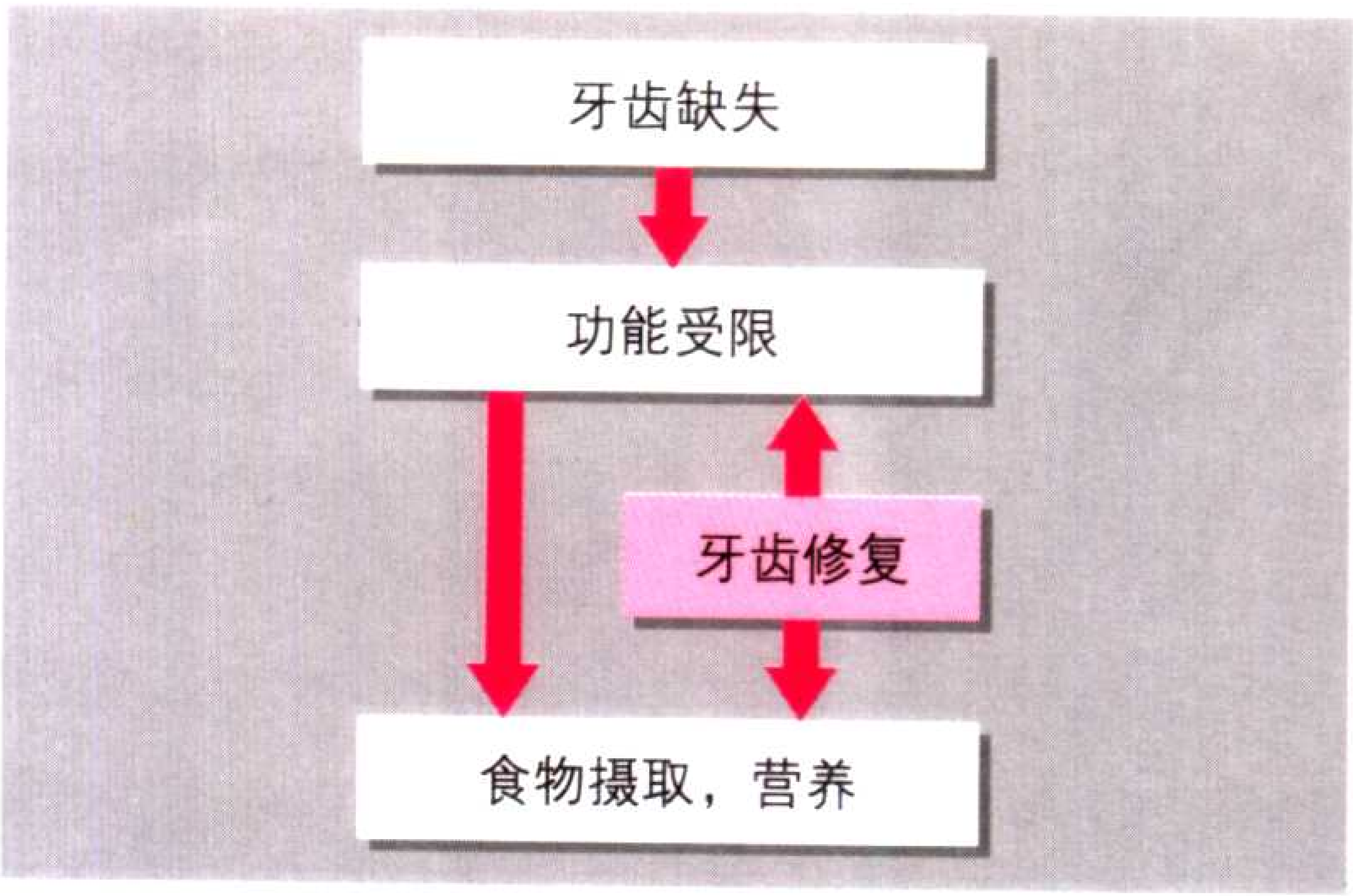


图 1-6 天然牙数量减少可能对咀嚼功能产生的影响

Fig 1-6 The possible effects of a reducing number of natural teeth on masticatory function

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能力。他们没有察觉到咀嚼功能受限，共同的研究结果表明，咀嚼功能的主观评价与客观评价之间没有什么相关性。最近的研究表明，患者在缺失了磨牙，甚至第二前磨牙的情况下仍能充分地咀嚼。人们推测患者是通过咽下较大的食团，而不是靠延长咀嚼时间来补偿功能受限。决定患者能否感觉到咀嚼受限的因素，看来是能产生咬合的上下后牙的对数。有证据表明，除非患者存在少于 3 对有咬合接触的后牙，否则在已经缩短的牙弓上修复缺失的磨牙是不会带来社会效益的。假设没有前牙缺失，即相当于还留有 21 颗或更多天然牙以及 3～5 对有咬合接触的后牙的"功能阈值"——也就是本章前面提到的"功能性牙列"。

However, many patients with large numbers of missing posterior teeth have little or no complaint about their ability to chew food. They have no perceived functional limitation and, indeed, the poor correlation between objective and subjective assessments of masticatory function is a common research finding. Recent research suggests that patients can masticate adequately without molars and even second premolars, the assumption being that they compensate for a poor occlusion by swallowing larger particles of food rather than chewing for longer. The factor determining whether a patient perceives a limitation of masticatory function appears to be the number of pairs of occluding posterior teeth. Evidence suggests that unless the patient has fewer than three occluding pairs of posterior teeth there is no socio-functional benefit to be gained from replacing missing molar teeth in shortened dental arches. Assuming no loss of anterior teeth, this equates to a "functional threshold" of 21 or more teeth with three to five pairs of occluding posterior teeth — the "functional dentition" referred to earlier in the chapter.

虽然因牙齿缺失导致的咀嚼功能受限与摄入食谱变窄之间的关系已经确立，但这种关系在牙列缺损患者中远没有在无牙颌患者中显得明确。有迹象表明牙齿的数量和分布与食物摄入关系密切。例如，随着可产生咬合的

The relationship between limitation of masticatory function resulting from tooth loss and impaired dietary intake has been established but much less clearly for the partially dentate than it has been for the edentulous. The indications are that the

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后牙对数的减少，每天摄入推荐数量的水果、蔬菜的可能性降低以至测量到的膳食纤维和维生素C摄入量下降。

虽然后牙缺失修复后咀嚼功能的恢复应该能增大选择食物的自由度，但如果不辅之以膳食指导，没有证据证实患者的食物摄取会增加。显然饮食习惯并不能简单地反映咀嚼功能。其他生活方式以及社会经济因素也是重要的影响因素，或许它们才是与牙齿的缺失相关的首要因素。由于牙齿缺失对咀嚼效率以及摄入食谱造成影响的依据几乎都来自发达国家，以上研究结果恐怕就不值得令人惊讶了。在工业化社会里，食物的充裕使得营养和生存已经不再是影响咀嚼功能的问题了。

维持𬌗稳定

牙齿缺失会导致对颌牙以及相邻牙之间失去稳定的接触，可能引起诸如倾斜、移位以及伸长等不良的牙齿

number and distribution of teeth are strongly associated with dietary intake. For example, the probability of achieving the recommended daily intake of a number of fruit and vegetables and that the measured intake of dietary fibre and vitamin C appears to fall with reducing numbers of pairs of occluding posterior teeth.

Although an improved masticatory function following the replacement of missing posterior teeth should allow more dietary freedom, there is no evidence that an improved dietary intake will be achieved unless treatment is accompanied by dietary advice. Clearly dietary habits do not simply reflect masticatory function. Other lifestyle and socio-economic factors are important influences and may, indeed, be associated with the loss of teeth in the first place. Given that the evidence for the effects of tooth loss on masticatory function and dietary intake is drawn almost exclusively from the developed countries, such findings are perhaps unsurprising. The less challenging nature of diets in industrialised societies means that nutrition and survival are no longer questions of masticatory function.

Maintaining occlusal stability

Loss of teeth can result in the loss of stable occlusal contacts between opposing teeth and contacts between adjacent teeth.

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移动（图 1–7）。患者因而寻求一种新的𬌗稳定位置以获得最大的牙齿接触。这会导致牙齿负荷异常，以及进一步的牙齿移动——即𬌗稳定的丧失。修复缺失牙会防治这种有害的移动，并保持长期的𬌗稳定。然而患者通常会在牙齿缺失数年后才寻求治疗，此时牙齿已经发生了某些移动，而且一种新的，通常是较不良的，但仍然稳定的牙尖交错关系已经形成。烈马已经脱缰而去，这时通过修复缺失牙来关上"马厩"之门已经无济于事。加重的牙齿移动多见于年轻患者，如果是成年人，则通常涉及到有牙周问题的牙齿。但这也并非不可避免，很多从业医师都有这样的临床经验，在口腔卫生状况足够好的地方，牙齿的位置会保持非常稳定。

This may lead to undesirable movements such as tilting, drifting and over eruption of teeth (Fig 1-7). Patients may seek a new occlusal position to maximise tooth contacts. This may then lead to abnormal loading of teeth and their further movement – a loss of occlusal stability. Replacement of missing teeth will prevent these unwanted movements and maintain occlusal stability in the long-term. However, patients will often seek treatment some years after the loss of teeth. Some movement of teeth may have already occurred and a new intercuspal relationship, often less desirable but nonetheless stable, established. The horse has bolted and shutting the stable door by replacing the missing teeth cannot be justified. Further these movements of teeth are not inevitable. They are seen more frequently in the young and, when seen in the adult, are more commonly associated with periodontally involved teeth. Where oral hygiene is adequate, it is the clinical expe-



图 1-7　𬌗稳定丧失后的牙齿移位

Fig 1-7　Tooth movements following the loss of stable occlusal contacts

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rience of many practitioners that the position of teeth will remain quite stable.

后牙缺失会导致在咀嚼过程中增加前牙的使用，从而使颞下颌关节负荷过重。此外，由于患者试图避免异常接触，以寻求一种新的最大程度的牙尖交错位，从而可能因牙齿移动导致肌肉功能型的改变，这个结果增加了颞下颌关节功能紊乱的可能。纠正异常的殆接触和修复缺失牙仍然在治疗颞下颌关节紊乱症状中起到重要作用，虽然后牙缺失与颞下颌关节紊乱症状发展之间的相关性证据并不充分。

Loss of posterior teeth results in an increased use of anterior teeth during mastication with, it is said, possible overloading of the temporomandibular apparatus. In addition, altered patterns of muscular function may result from the movement of teeth as the patient attempts to avoid abnormal contacts and seeks a new position of maximum intercuspation. The consequence is said to be an increased predisposition to temporomandibular joint dysfunction. Whilst the correction of abnormal occlusal contacts and replacement of missing teeth still feature in the treatment of patients with symptoms of temporomandibular dysfunction, evidence supporting an association between the loss of posterior teeth and the development of symptoms of temporomandibular dysfunction is lacking.

使用可摘局部义齿的后果

Consequences of Partial Denture Use

可摘局部义齿的使用后果可以从以下几个方面来考虑：

- 患者的接受程度
- 长期效果

The possible consequences of the provision of partial dentures can be considered under the following headings:

- *patient acceptance*
- long-term effects.

患者的接受程度

虽然可摘局部义齿的广泛使用消耗了相当的治疗费用，但过去的研究

Patient acceptance

Although their widespread use continues at considerable cost, past studies have es-

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确认有10%～60%的患者并没有戴用他们的可摘局部义齿，尽管他们原打算改善美观、提高功能。在各种研究报道中，可摘局部义齿的接受率差异很大，这可能与各个研究中的样本量、患者类型以及评价方法不同有关。但值得强调的一点是，这些报道都缺乏能解释可摘局部义齿不被接受的共同临床原因。很明显，从可摘局部义齿的广泛使用情况来看，临床期望与治疗结果之间差异明显。由于对可摘局部义齿可能的长期治疗需要，这表明至少存在着一种很大的资源浪费。对于相当一部分患者来说，他们对可摘局部义齿的需要和优点的认识，与临床医师的理解是不同的。

人们倾向于把弃用可摘局部义齿单纯地归于设计上的缺陷。显然义齿不贴合、破损或有殆干扰会令患者难以接受。然而，假如义齿制作良好，也没有明确的证据证实设计方面的问题，例如材料、Kennedy分类以及连接体的类型，会严重影响患者对义齿的接受。惟一可以确定的是用可摘局部义齿修复前牙缺失时，义齿的材料（树脂或金属）、设计和安放的位置的确会影响患者对使用义齿的态度，但也只是很小程度的影响。看来患者接受和使用可摘局部义齿的主要驱动力源自于患者

tablished rates of patient non-use of partial dentures that range from 10 to 60%, irrespective of any intended benefit to appearance and function. The wide variation in reported acceptance rates probably reflects differing study numbers, patient types and assessment methods but a feature emphasised in many of these reports is the absence of common clinical factors to explain non-acceptance. What is clear is that there is a significant divergence between clinical intent and treatment outcome as measured by the prevalence of partial denture use. Together with the potential of partial dentures to generate an additional long-term treatment need, this represents, at best, a considerable potential waste of resource. For a significant number of patients the perception of the need for or benefit of partial dentures differs from that of the clinician.

It is tempting to ascribe non-use of partial dentures solely to deficiencies in their design. Clearly, patients find difficulty tolerating dentures that are illfitting, broken or interfere with normal occlusal contacts. However, assuming the adequacy of their construction, there is no strong evidence that aspects of design, e.g., material, Kennedy classification and connector type, are important influences on patient acceptance. The only clearly established predictor for partial denture use is the presence of anterior replacement teeth. Denture

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使用可摘局部义齿获得的功能。如果没有功能的存在，患者就会认为不值得忍受戴用活动义齿的不便，从而停止戴用义齿。

materials (acrylic or metal), design and location did influence attitudes to partial denture use but to a much smaller extent. It does appear that the main driver for acceptance and use of partial dentures is a perceived functional gain by the patient. If no functional benefit is perceived, then the patient decides that the inconvenience is not worth it and stops wearing them.

长期效果

可摘局部义齿可能提供容貌上的改观和功能上的提高，但同时长期使用也会对余留牙和支持软组织产生潜在危害。从广义上说，这种危害是指由于龋病和牙周病发病率增高，以及支持义齿的那部分牙槽突持续吸收增加导致的余留牙局部损害。

Long-term effects

The possible advantage of improved appearance and function offered by partial dentures should be balanced against their long-term potential to cause harm to the remaining teeth and supporting soft tissues. In broad terms this harm can be described as a risk of local damage to the remaining teeth resulting from an increased incidence of caries and periodontal disease and the continued resorption of those parts of the alveolar process supporting the partial denture.

龋病与牙周病

临床研究发现指出，可摘局部义齿的长期使用与余留牙的龋病以及牙周状况的恶化相关（图1-8）。操作良好的临床对照试验，以及大样本流行病学调查结果都证实了这种相关性的存在。现在有强有力的证据证实：戴用可摘局部义齿的患者其龋病发病率升高，牙周病的发病率也略有升高。这些研

Caries and periodontal disease

The subjective clinical findings pointing to an association between the use of partial dentures and deteriorating caries and periodontal status of the remaining natural teeth have been of longstanding concern (Fig 1-8). Wellconducted controlled clinical trials and findings from large epidemiological surveys have established this association

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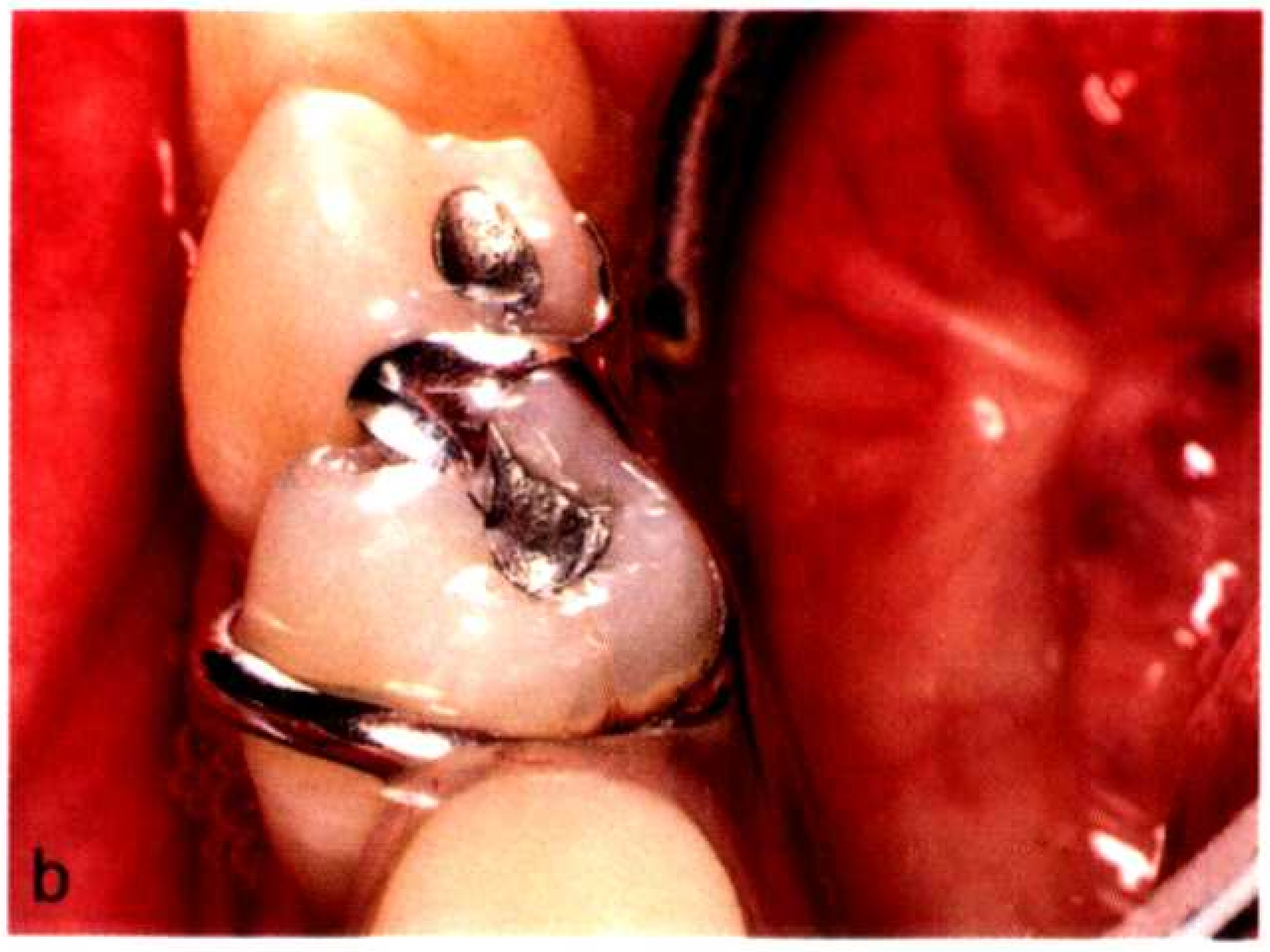


图 1-8　龋病和牙周病看起来与可摘局部义齿的使用有关

Fig 1-8(a,b) Caries and periodontal disease apparently associated with the use of a partial denture

究结果可以归纳为如下几点：

- 桥基牙较其他牙齿更易患龋病和牙周病。
- 在年龄较大的患者中可摘局部义齿的使用与根面龋关系密切，尤其是牙列缺损的患者往往年龄偏大，根龋治疗困难。
- 相比较而言，戴用可摘局部义齿患者新发龋病的危险性几乎是戴用固定义齿患者的 4 倍。
- 不良的可摘局部义齿会使根部龋和牙周病更易发生。

and there is now a powerful evidence base for an increased incidence of caries and, to a lesser extent, periodontal disease in patients wearing partial dentures. These findings can be summarised as follows:

- Abutment teeth were more likely to have caries and periodontal disease than all other teeth.
- In the elderly, the presence of a partial denture was strongly associated with root surface caries. This finding is of particular concern given that the partially dentate tend to be elderly and that the management of root caries is at best difficult if not intractable.
- The relative risk of new caries was approximately four times greater for patients wearing partial dentures than in those with fixed prosthesis.
- Root caries and periodontal diseases were more frequent when the partial denture was defective.

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- 戴用可摘局部义齿的患者其患龋率升高与人口统计学因素以及其他龋病危险因素，如糖的摄入、唾液流量无关。
- 高水平的菌斑控制会减弱龋病和牙周病发病率的升高。也就是说，可摘局部义齿本身不会导致龋病和牙周病。

- The increased incidence of caries in partial denture wearers was independent of patient demographic factors and other caries risk factors such as sugar intake and salivary flow.
- High levels of plaque control can offset the increased incidence of caries and periodontal disease – that is, a partial denture *per se* will not cause carious and periodontal lesions.

菌斑与可摘局部义齿

牙菌斑是龋病和牙周病共同的主要病因。在缺乏有效菌斑控制的情况下，可摘局部义齿的使用增加了龋病和牙周病的发病率，这表明改变是通过可摘局部义齿影响牙菌斑形成而发生的。可摘局部义齿和牙菌斑的关系已成为众多调查研究的题目。这些调查研究的成果如下：

- 可摘局部义齿的确通过增加菌斑的量，改变菌斑沉积的方式，可能还改变菌斑形成的类型来反作用于菌斑的形成。牙菌斑在邻近可摘局部义齿以及被可摘局部义齿覆盖的牙齿表面增加较明显，在其他牙面上也会出现（图 1-9）。

Plaque and partial dentures

Dental plaque is the main aetiologic factor in both caries and periodontal disease. Given that the use of partial dentures in the absence of effective plaque control increases the incidence of caries and periodontal disease, the suggestion is that this change occurs through an effect of partial dentures on plaque formation. The relationship between partial dentures and plaque has been the subject of numerous investigations and their findings are as follows:

- Partial dentures do adversely affect plaque formation by increasing its amount and altering the pattern of its deposition and probably the type of plaque formed. The increase in plaque formation was greater on tooth surfaces adjacent to and covered by the partial denture and was also apparent on teeth free from the partial denture (Fig 1-9).

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图 1-9　在邻近可摘局部义齿的牙面上有菌斑形成

Fig 1-9　Plaque formation on surfaces adjacent to a partial denture

• 戴用可摘局部义齿时，一般的刷牙不会抵消菌斑的增长。这暗示在不戴用可摘局部义齿时被认为是"充分"的菌斑控制，在戴用可摘局部义齿以后就不能再做到"充分"了。医师应该特别为患者指出，邻近义齿基托的牙面以及其他被义齿覆盖的牙面必须予以特别注意。医师还应该向患者推荐并演示其他的清洁措施。

• Normal toothbrushing did not offset the increase in plaque seen when partial dentures were worn. The implication is that a level of plaque control deemed "adequate" without a partial denture may not remain so when a partial denture is worn. In particular, proximal surfaces adjacent to denture bases and other surfaces covered by denture components should be pointed out to patients as surfaces to which they must give special attention. Additional cleaning aids will normally be required and patients should be advised about them and their use demonstrated.

牙槽突的变化

在临床上经常发现有支持牙槽突的吸收。常见后果是固位力和稳定性下降，殆接触消失，以及义齿部件折断。更有甚者，不贴合的义齿造成的创伤进而会引起义齿接触区的黏膜发炎。

Changes to the alveolar process

Resorption of the supporting alveolar process is a frequent clinical finding. Common consequences are reduced retention, instability, loss of occlusal contacts and fracture of denture components. Further,

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这些外伤和白色念珠菌等菌类的过度生长被认为是造成义齿性口炎最常见的病因，常见于不贴合的上颌义齿。

trauma from the resulting ill-fitting dentures may well cause inflammation of the denturebearing mucosa. Such trauma and an overgrowth of the fungus *Candida albicans* are thought to be the most common causes of denture-induced stomatitis not infrequently seen under ill-fitting upper dentures.

至于义齿的使用与牙槽突的吸收之间是否有因果关系，这一问题尚无明确答案。虽然一些研究强烈支持了这种关系，但较小的样本量与较大的个体差异令人质疑结果的有效性。没有证据表明不戴用义齿会发生牙槽突的失用性萎缩。

The question as to whether there is a cause-effect relationship between this resorptive process and denture use has not been clearly answered. Although several studies strongly suggest this relationship, the small study populations and the large individual variations seen have cast doubt on the validity of the results. There is no evidence for the concept of disuse atrophy in non-denture wearers.

重　点

- 更多的人步入老年后仍能保留一些自体牙齿，并且保留牙齿的数量还将增加。
- 未来人们将需要更多的可摘局部义齿来恢复美观和功能。
- 长期戴用可摘局部义齿与龋病和牙周病的发病率增高相关。
- 修复缺失的前牙是戴用可摘局部义齿的主要动机，咀嚼功能的改善则排在第2位。

Key Points

- More people will retain some of their own teeth into old age and the number of teeth retained will increase.
- The future need for partial dentures to restore aesthetic and functional limitations will increase.
- The long-term use of partial dentures is associated with an increased incidence of caries and periodontal disease.
- Replacement of missing front teeth is the main factor motivating the use of partial dentures. Improved mastication

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• 对可摘局部义齿的需求应该基于患者对其理解基础上的需求。

is of secondary importance.

• The provision of partial dentures should be based on a patient's perceived need.

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第 2 章 可摘局部义齿的适应证

Indications for Partial Dentures

目　的

本章旨在阐述适于应用可摘局部义齿来修复牙列缺损的临床及患者相关性因素。此外，本章将强调可摘局部义齿的应用要基于可预期的美观和功能需求，并向从业医师介绍为牙列缺损患者制定以功能为导向的治疗计划的概念。

要　点

阅读本章后，从业医师应该意识到缺失牙并非都需要修复，有效的可摘局部义齿的应用应该基于患者的需求。一旦建立了这种需求，就有了明确的临床和患者相关性因素来决定优先采用可摘局部义齿修复，而不是采用包括固定修复体和种植修复体在内的其他治疗。

Aim

This chapter aims to describe the clinical and patient-related factors that indicate the use of partial dentures to restore partially dentate patients. In addition, it will emphasise the need to base the provision of partial dentures on perceived aesthetic and functional needs and introduce the practitioner to the concept of functionally oriented treatment planning for the partially dentate.

Outcome

After reading this chapter, the practitioner should be aware that missing teeth do not always need to be replaced and that the effective provision of partial dentures should be based on the establishment of patient need. Once this need has been established, there are clear clinical and patient-related factors that indicate the use of partial dentures in preference to other treatment options including fixed prosthesis and implant-supported prosthesis.

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治疗方案的选择

在为牙列缺损患者制订治疗计划时，可能有好几个选择来修复缺失的牙齿（框2-1）。有一系列的建议使用可摘局部义齿的临床和患者相关性因素，这将在本章后面部分加以介绍。然而，需要强调的是，首先要考虑的问题在于是否任何缺失牙都要修复。

Treatment Options

When formulating treatment plans for partially dentate patients, several treatment options may be possible for the replacement of missing teeth (Box 2-1). A number of clinical and patient-related factors will suggest the use of partial dentures, and these will be described in later sections of this chapter. However, it should be emphasised that the first question to be considered is whether or not any missing teeth should be replaced.

框2-1

修复缺失牙的治疗方案

不修复

固定修复(常规型，粘结型或者混合型)

可摘局部义齿

种植支持式义齿（固定或活动）

固定、可摘联合修复体

Box 2-1

Treatment Options for the Replacement of Missing Teeth

No replacement

Fixed prosthesis (conventional, adhesive or hybrid)

Partial dentures

Implant-supported prosthesis (fixed or removable)

A combination of fixed and removable prosthesis

不使用可摘局部义齿的原因

按照惯例，所有缺失的牙齿都需要修复，以维持功能、保持稳定——即牙弓完整的概念。虽然缺失的牙齿一

Reasons Not to Provide Partial Dentures

Traditionally, the replacement of all missing teeth was thought necessary to preserve function and maintain occlusal sta-

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定都能修复，但有证据明确指出缺失牙的修复一定要以患者自己预期的美观和需要的功能为基础——即功能导向法。第1章中叙述的证据明确指出可摘局部义齿的使用如果不建立在一种可预期的需求上，造成的后果是轻则患者不愿戴用义齿，重则余留牙损坏甚至脱落，需要附加的治疗。这一证据，以及预测的局部缺牙老年患者数量的增加，都表示需要采用新的治疗方案来满足未来老年人群的需求。当要求有效利用健康资源的压力越来越大，而医疗资源不仅有限，并且可能随时间而减少的时候，这一点尤其重要。

bility – the concept of arch integrity. Whilst it is invariably possible to replace missing teeth, the evidence clearly indicates that replacement must be based on self-perceived aesthetic and functional needs by the patient – a functionally oriented approach. The evidence described in Chapter 1 clearly indicates that the failure to base partial denture provision on a perceived need will, at best, result in the denture not being worn and, at worst, result in an additional treatment need through harm to and the possible future loss of remaining teeth. This evidence, together with the predictions for increasing numbers of older partially dentate adults, indicates that new treatment strategies are required to meet the demands of the future elderly population. This is particularly so when there are increasing pressures to ensure the effective use of health resources which are not only finite but may also decrease with time.

功能导向法

目前的研究表明修复所有的缺失牙是没有必要的，有时甚至是不妥的。很多患者，尤其是年龄较大的患者在不修复缺失后牙时，其咀嚼功能即使不能达到最佳，但也已经足够。有21颗或更多颗天然牙，尤其是至少有3对有咬合接触的后牙时，牙列被称为"功能性牙列"。

A functionally oriented approach

Current research suggests that the replacement of all missing teeth is unnecessary and at times inadvisable. Many patients and, in particular elderly patients, can function adequately, if suboptimally, without the replacement of missing posterior teeth. Evidence describes such a "functional dentition" as one with 21 or more teeth or, more specifically, one with at least three pairs of

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功能导向法是一种仅当患者的需要被建立以后才对缺失牙进行修复的方法。短牙弓（SDA）概念就是这种方法的一个例子。这种方法尤其适用于年龄较大，经济能力有限的患者的修复治疗。治疗的人力物力应该用在解决患者的问题以及保留那些对患者的美观和功能有用的牙齿上。这通常意味着治疗应该集中在保存前牙和前磨牙上（图2-1）。只有当磨牙缺失给患者带来问题的时候才需要修复，因此可能的话，避免使用可摘局部义齿。SDA法成功应用的关键是选择合适的病例。SDA法的主要要求是：（i）保留的前牙和前磨牙的长期预后应该是良好的；（ii）鼓励患者保留这些牙齿。虽然将来一两颗牙的缺失可以用固定修复体来补偿，但牙齿持续的缺失会累及美观和功能。框2-2是SDA方法的禁忌证。

opposing posterior teeth.

A functionally oriented approach is one in which teeth are replaced only in response to an established patient need. The shortened dental arch (SDA) concept is one example of this approach, which is, in particular, applicable to the elderly and where limited finance is available for restorative care. Treatment effort and resources are directed at solving patients' problems and are targeted on preserving those teeth necessary to meet the patients' aesthetic and functional needs. This normally implies that treatment is focused on maintaining anterior and premolar teeth (Fig 2-1). Molars are replaced only if their absence causes problems to the patient and thus the use of partial dentures is avoided if possible. Appropriate case selection is essential for the successful application of the SDA approach. The main requirements for the SDA approach are (i) the long-term prognosis for the remaining anterior and



图2-1 短牙弓。未来的治疗将会以保存余留的前牙和前磨牙的功能为指导思想

Fig 2-1 A shortened dental arch. Future treatment will be directed at maintaining the function of the remaining anterior and premolar teeth

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premolar teeth should be good and (ii) the patient is motivated to maintain them. Although the future loss of one or two of the remaining teeth can be accommodated by the use of simple fixed prosthesis, the continued loss of teeth will compromise appearance and function. Contraindications to the SDA approach are given in Box 2-2.

框 2-2

短牙弓法的禁忌证

严重的Ⅱ类或Ⅲ类切牙关系

已经存在颞下颌关节功能紊乱

严重的病理性磨损

严重的牙周疾病

患者年龄低于40岁

功能异常

Box 2-2

Shortened Dental Arch Approach: Contraindications

Severe Class II or Class III incisal relationships

Pre-existing temporomandibular dysfunction

Advanced pathological wear

Advanced periodontal disease

Patient is under the age of 40 years

Parafunction

功能导向法会使可摘局部义齿的应用减少，但效率提高。这也表明使用可摘局部义齿以外的其他治疗方法来修复缺失牙更恰当。举例见图2-2。

A functionally orientated approach will result in a reduced but more effective provision of partial dentures. It may also indicate that treatment options other than the use of partial dentures to replace missing teeth are more appropriate. An example of this approach is shown in Fig 2-2.

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图 2-2 a. 一个 80 岁的女性患者，她所关注的仅仅是缺失的⌊2，⌊2 和其他缺失的上颌牙采用一个上颌可摘局部义齿进行修复；b. 患者没有抱怨义齿是否贴合，但仅在社交场合戴用，吃饭的时候却不戴，认为它影响味觉，并且体积大，余留牙很健康；c,d. 采用一个简单的树脂粘结的单端固定桥来代替上颌可摘局部义齿修复⌊2

Fig 2-2 (a) An 80-year-old female whose only concern was the missing UL2. UL2 and other missing upper teeth are replaced by an upper partial denture (b). The patient had no complaint about the fit of the denture but restricted its use to social occasions and avoided using it for eating because it interfered with taste and felt bulky. The remaining teeth were sound. (c,d) The upper partial denture was replaced by a simple cantilever resin-bonded bridge restoring the missing UL2

使用可摘局部义齿的时机

建立修复缺失牙的需求以后，从机械力学和功能角度来看，固定义齿或种植支持修复体往往是首选，只有当这几种方案禁忌时才考虑使用可摘局部义齿。在某些情况下这是正确的，但不尽然，尤其是当固定义齿的应用

When to Use Partial Dentures

Having established the need to replace missing teeth, from a mechanistic and functional viewpoint, it could be argued that a fixed or implant-supported prosthesis will always be the treatment of choice and that a partial denture is indicated only when al-

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受到桥基牙条件和缺牙区长度限制时。而在固定和活动修复体同样适用的地方，其他的患者相关性因素可能更倾向于采用可摘局部义齿。可摘局部义齿的适应证将在后面单独详述。在实际应用中，固定义齿和可摘局部义齿并不是相互排斥的，而是有相当多的重叠。

ternative treatments are contraindicated. In some respects this is true, in particular with regard to fixed prostheses where their use may be considered to be limited by the suitability of potential abutment teeth and the length of the edentulous span. Where the use of either a fixed or removable prosthesis is equally feasible, other patient-related factors may suggest the use of partial dentures. The indications for the use of partial dentures are considered separately in the following sections. In reality they are not mutually exclusive and there is considerable overlap.

缺失牙的数目和分布

缺失牙的数目和缺牙区的长度是特别重要的因素。当形成两端有牙的较长缺牙区时，强烈建议采用可摘局部义齿。在牙弓后段，这往往意味着缺失至少连续3颗牙的间隙。这样长的间隙对于选择合适的固定义齿基牙难度很大。当两侧各有一个这样的连续间隙时，可摘局部义齿可以提供一种简单有效的方法来修复缺失牙，即可摘局部义齿具有能够把多个缺牙间隙连接成一个功能整体的独特优点（图 2-3）。单个至四个切牙全部缺失形成的缺隙，用固定义齿来修复是最有效的。在这种情况下若使用可摘局部义齿会影响美观，并且很难保证义齿的稳定，尤其是当患者咬切食物的时候。当前

Number and distribution of missing teeth

Factors of particular importance are the length and number of edentulous spaces. Partial dentures are strongly indicated when the loss of teeth is restricted to long edentulous bounded saddles. In posterior segments, this usually means contiguous spans of at least three teeth and reflects the increasing difficulties of identifying suitable abutments for fixed prosthesis for spans of this length. Where two such contiguous spans are located bilaterally, partial dentures can offer a simple and effective means of tooth replacement that demonstrates their particular advantage of joining a number of edentulous spaces into one functional unit (Fig 2-3). Single anterior

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牙鞍基的长度增加到包括修复尖牙以至前磨牙的时候，就需要采用可摘局部义齿了。广泛的前后牙混合缺失，尤其是几个不同缺牙区的同时修复，更是使用可摘局部义齿的指征（图2-4）。

edentulous spaces up to and including the four incisor teeth are most effectively restored using fixed prostheses. Use of partial dentures in such circumstances can result in a compromised appearance and difficulty ensuring denture stability, in particular when patients incise food. As the length of the anterior saddle increases to include replacement of canine and then premolar teeth, so does the indication for the use of partial dentures. Partial dentures are indicated when extensive anterior and posterior tooth loss occurs in combination and their particular attribute simultaneously to restore different edentulous spaces is again demonstrated (Fig 2-4).



图 2-3　用一个上颌可摘局部义齿有效地修复了两个双端有牙的后牙缺失区

Fig 2-3　Use of an upper partial denture to replace effectively two bounded posterior saddles



图 2-4　用一个可摘局部义齿来修复前后牙混合缺失

Fig 2-4　Use of a partial denture to restore combined anterior and posterior tooth loss

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超短牙弓患者往往抱怨咬切和咀嚼食物困难，通常采用远中游离端鞍基的可摘局部义齿修复。当超短下颌牙弓与上颌全口义齿咬合时，下颌游离端义齿会通过分配牙弓接触来提供𬌗稳定。据说这会有利于上颌全口义齿的稳定和固位，并有助于避免上颌前牙区牙槽嵴的快速吸收，即通常所说的"并发症"发生。近来更多的证据表明：即使对于下颌短牙弓而上颌全口义齿的老年患者来说，常规或粘结的远中悬臂固定修复体仍是更好的解决方法。但这仅限于可以找到足够多的合适桥基牙来修复至少有连续8颗牙齿的短牙弓（图2-5），否则，可摘局部义齿应该是有效的修复方式，虽然此时也可以考虑使用种植体支持的修复体来修复。

可摘局部义齿不适用于修复1～2个前牙或后牙缺失，庞大体积、可能出现的动度以及相对复杂的设计会使获得的美观和功能大打折扣。在这种情

Severely shortened dental arches are frequently associated with complaints of difficulties in biting and chewing food and have traditionally been restored using free-end saddle partial dentures. Where a severely shortened lower dental arch opposes a complete upper denture, a lower free-end saddle denture provides occlusal stability through the distribution of contacts around the arch. This is said to contribute to the continued stability and retention of the complete upper denture and avoids the potential for rapid and continued resorption of the anterior upper edentulous ridge often described as the "combination syndrome". More recent evidence suggests that, in the elderly, restoration with single-pontic distal cantilever fixed prosthesis of conventional or adhesive design can be a more effective solution even when the lower SDA is opposed by a complete denture. This is only possible if there are sufficient remaining suitable abutment teeth to allow restoration of a contiguous SDA of at least eight teeth (Fig 2-5). If this is not the case, restoration should be effected with a partial denture although the use of implant-supported prosthesis may also be considered.

Partial dentures are unsuited to the restoration of one or two-tooth anterior or posterior spaces where their bulk, potential for movement and relative complexity of de-

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况下应选用固定义齿。可摘局部义齿应该用于数个小缺隙的修复，这时简单的可摘局部义齿可以代替复杂的固定义齿（图 2-6）。

sign can offset any aesthetic or functional gain. In such circumstances, fixed prostheses are the treatment of choice. Partial dentures should, however, be considered where several short spans are to be restored. In such circumstances, partial dentures offer a simple alternative to potentially complex fixed restorations (Fig 2-6).

潜在桥基牙的情况

相关因素包括桥基牙的排列、充填情况以及桥基牙预后。为了建立有效的就位道，不良的桥基牙排列往往

Status of potential abutment teeth

Relevant factors include the alignment, restorative status and prognosis of potential abutment teeth. The unfavourable align-

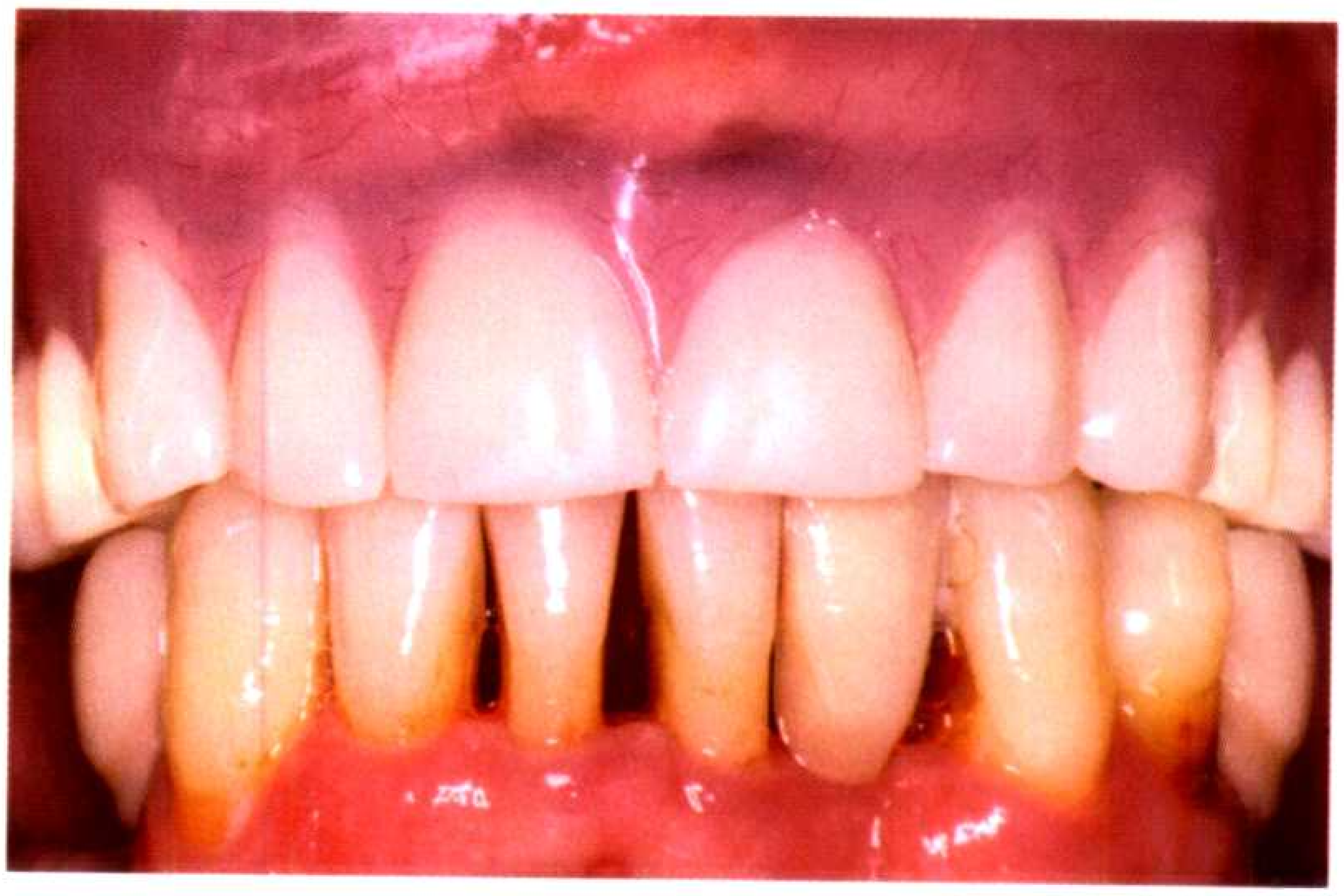


图 2-5　短下颌牙弓采用树脂粘结桥修复 $\overline{4|25}$ 与上颌全口义齿对应

Fig 2-5 Resin-bonded brid-gework replacing LL5, LL2 and LR4 to restore a shortened lower dental arch opposing a complete upper denture



图 2-6　一个上颌可摘局部义齿修复数个小失牙间隙

Fig 2-6 An upper partial denture replacing several short edentulous spans

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需要磨除大量的牙体组织，这时可以排除使用固定修复体（图2-7）。为使用常规固定义齿而制备以前没有充填过的牙体越来越不为人们所接受，尤其是对于较年轻的患者。牺牲健康牙体组织是不可逆转的，虽然有证据证实：临床制作精良的修复体的使用寿命可以≥15年，但失败的后果常常是严重的，甚至可以导致桥基牙的脱落。粘结固定义齿可以解决较小的，最多两颗牙缺隙的修复（图2-8）。桥基牙的不良预后使固定义齿修复的长期成功存在一定的风险，尤其是那些跨度长、复杂的修复体。其他的危险因素包括已经或者需要大面积充填，牙髓治疗不完善或需要牙髓治疗，以及牙周情况不良或不稳定。在这种情况下，可摘局部义齿是一种修复缺失牙的简单、实用、有效的方法。

ment of potential abutments can preclude the use of a fixed prosthesis through the need to remove extensive amounts of tooth tissue to establish a usable path of insertion (Fig 2-7). There is an increasing reluctance to prepare previously unrestored teeth for a conventional fixed prosthesis, in particular, in younger patients. The loss of sound tooth tissue is irreversible and, although evidence suggests that the survival rates for a clinically excellent fixed prosthesis can be ≥ 15 years, failure is often catastrophic and can result in the loss of abutment teeth. Adhesive fixed prosthesis may offer a solution for the restoration of short edentulous spans up to a maximum of two teeth (Fig 2-8). Abutment teeth of poor prognosis put the long-term success of fixed prostheses at risk – in particular those that are extensive and complex. Other risk factors include previous or required extensive restoration, the adequacy of or need for endodontic treatment and a poor or unstable periodontal status. In such circumstances, partial dentures can offer a simpler, pragmatic and effective means of replacing teeth.

软组织丧失

外伤导致的牙缺失或者无牙颌牙槽嵴的持续吸收，都可能造成支持软组织的明显丧失（图2-9a）。当这种由于前牙区组织丧失造成的、垂直或者

Soft tissue loss

The traumatic loss of teeth or the continued resorption of the edentulous ridge may be associated with significant loss of the supporting soft tissues (Fig 2-9a). Failure

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图 2-7　上颌尖牙的排列妨碍了常规固定桥的使用

Fig 2-7 Alignment of the upper canines precludes the use of a conventional fixed bridge

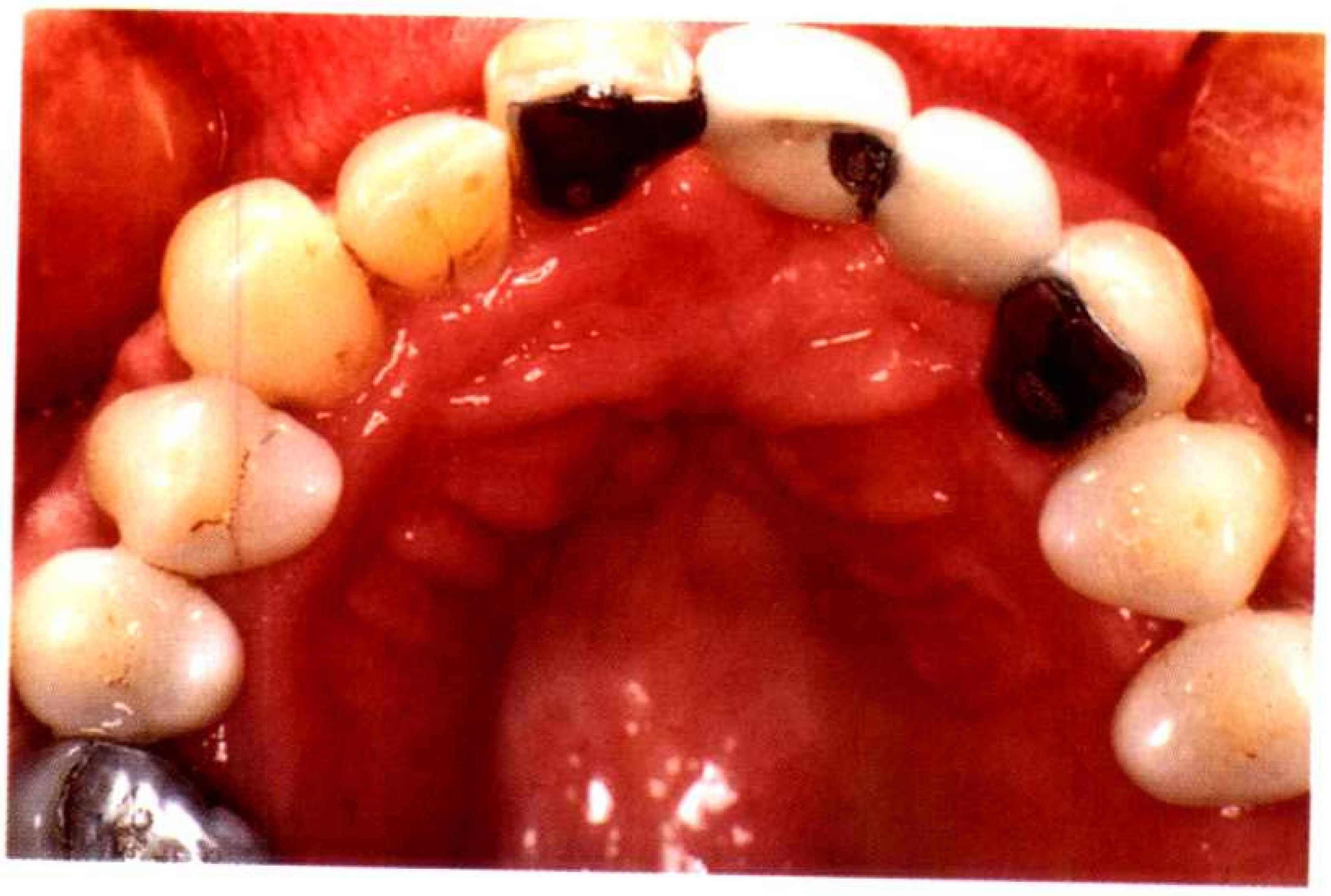


图 2-8　用两个树脂粘结的单端固定桥修复一个两颗牙的缺失间隙

Fig 2-8 Use of two cantilever resin-bonded bridges to restore a two-tooth edentulous span

水平方向的软组织外形缺陷修复不当时，修复体常因牙位排列不当和唇支持不足而使外形欠佳。固定义齿不能修复大面积软组织缺失，此时最好采用可摘局部义齿修复。可摘局部义齿的树脂鞍基和翼缘可以很容易地通过调整来修复缺失的软组织，使义齿位置排列正确，唇部丰满度得以恢复（图 2-9b）。

to restore the vertical and horizontal deficiencies in the soft tissue contour resulting from tissue loss in the anterior segment will result in a poor appearance due to incorrect tooth position and inadequate lip support. Fixed prosthesis cannot adequately restore extensive soft tissue loss which is best effected with partial dentures where the saddle acrylic and flange can be easily modified to replace lost soft tissue, allow the correct positioning of replacement teeth and restore labial fullness (Fig 2-9b).

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图2-9 a. 外伤导致的前牙缺失伴明显的骨缺失；b. 用可摘局部义齿修复缺失的组织，可以使前牙能排列到合适的位置，同时唇部也能得到正常的支持

Fig 2-9 (a) Significant bone loss associated with the loss of anterior teeth as a result of trauma, (b) Restoration of the lost tissue with a partial denture saddle allows the correct positioning of replacement anterior teeth and normal labial support

前牙间隙

外形自然的修复体可能需要在前牙间留出间隙（图2-10）。在复制2颗或多颗切牙间的牙间缝时通常不会使用固定修复体，可摘局部义齿可以简单有效地恢复外貌。在修复带间隙的单个前牙时，固定义齿和活动义齿都是可行的，但都不够理想。最有效的治疗选择是单颗牙种植（图2-11）。

Anterior tooth spacing

Restoration of an acceptable appearance may require the use of spaced anterior teeth (Fig 2-10). The reproduction of a midline diastema between two or more replacement incisor teeth will normally preclude the use of a fixed prosthesis and appearance is simply and effectively restored with a partial denture. In the particular circumstance of the replacement of a single anterior tooth with spacing, fixed and removable options are possible but far from ideal and the most effective treatment option is the single-tooth implant (Fig 2-11).

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图2-10 有中缝的前牙修复时一种合适的牙齿排列

Fig 2-10 An acceptable arrangement of the replacement anterior teeth required inclusion of a midline diastema



图2-11 单颗牙种植以修复有间隙的|2(感谢 DG Smith 先生)

Fig 2-11 A single-tooth implant replacing the missing UL2 with spacing. (Courtesy of Mr D G Smith.)

恢复殆面高度

牙周损伤或殆因素引起的后牙邻接关系丧失会导致殆面高度不足，前牙倾斜展开（咬合破坏）或严重损耗（图 2-12）。如果前牙接触丧失，则咬合闭锁可造成腭组织创伤。对于这种患者理想的治疗通常是使用可摘局部义齿修复缺失的后牙，有必要的话覆盖磨损的牙齿，从而恢复并稳定殆面高度（图 2-13）。这种义齿可用作永久性修复，也可以作为过渡性修复，在永久的固定或可摘义齿戴用之前恢复容貌，稳定殆关系。

Restoration of occlusalface height

The loss of posterior tooth contacts as a consequence of damaging periodontal or occlusal factors can result in the loss of occlusal face height with anterior teeth becoming proclined and splayed (bite collapse) or heavily worn (Fig 2-12). If anterior contact is absent overclosure with trauma to the palatal tissues will result. The ideal treatment for such patients is often to restore and stabilise the occlusal face height with partial dentures that replace the missing posterior teeth and overlay worn teeth if necessary (Fig 2-13). Such dentures may be used as the definitive restoration or as an interim prosthesis that acts to restore appearance and provide occlusal stability before the provision of definitive fixed or removable prosthesis.

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图 2-12 殆面高度下降伴牙齿接触消失、磨耗和牙周病。(a)展开的前牙显然可能造成腭部软组织损伤(b,c)

Fig 2-12 Loss of occlusal face height associated with various combinations of loss of tooth contacts, wear and peri-odontal disease, (a) Splaying of the remaining anterior teeth is evident as is (b,c) the potential for palatal soft tissue trauma



图 2-13 可摘覆盖义齿恢复图 2-12b 中患者的殆面高度和外形

Fig 2-13 Overlay partial dentures used to restore occlusal face height and appearance for the patient illustrated in Fig 2-12b

患者的偏爱和价格

治疗方式的最后决定者显然是患者本人。在做出治疗决定之前，必须让患者明确各种治疗方式的程序、价格以及它们各自可能达到的效果，最后

Patient preference and cost

The final arbiter in the choice of treatment is clearly the patient. Prior to making treatment decisions the patient must be fully informed of the procedures and costs in-

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的结局。虽然方式的选择是个人偏好的反映，但也有一些普遍的趋势。有证据表明较年轻的患者一般不愿采用可摘局部义齿，而年老体弱、健康情况不好以及不能独立生活的患者一般不会采用费时较多、临床程序要求严格的固定修复体，转而选用简单的可摘局部义齿。

volved in the various treatment options and their likely effectiveness and outcome. Although the choices of treatment will reflect individual preference, some general trends are there. Evidence indicates that younger patients prefer to avoid the use of partial dentures. For the elderly, frailty, poor general health and non-independent living may preclude more time consuming and demanding clinical procedures associated with the use of fixed prostheses and the simpler alternative of partial dentures is preferred.

患者对治疗费用的承受力对修复方式的选择影响很大，虽然影响力度随着公共基金对治疗费用的承受程度而变化。对治疗的初始价格的调查显示可摘局部义齿是最便宜的治疗方式。毫无疑问这使得可摘局部义齿成为迄今为止最常用的修复方法，但这种看法忽略了潜在的长期维护和附加的治疗费用。遗憾的是我们缺乏对各种修复方式效价比较的分析。

The ability of a patient to afford treatment has a strong influence on the choice of restoration although the strength of this influence will vary with the contribution of any public funding to support the costs of treatment. An examination of the initial costs of treatment provision would suggest that partial dentures are the least costly treatment option. This undoubtedly contributes to their status as by far the most common means of replacing missing teeth. Such considerations tend to ignore the potential for long-term maintenance and additional treatment costs. Regrettably, a comparative cost benefit analysis of the various treatment options is lacking.

缺失牙的过渡性修复

An interim replacement for missing teeth

在修复牙列缺损的总治疗计划中，

Partial dentures may be required as an

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可摘局部义齿可能被用作一种过渡性的治疗，它们可能在余留牙最终全部脱落成为无牙颌，不可避免的使用全口义齿的过渡期中起到辅助作用。这种义齿其本质是临时的，称为过渡性可摘局部义齿。在第7章中将详细探讨这种义齿。

interim measure in a general treatment plan for the restoration of a partially edentulous mouth. They may aid the transition to edentulousness when the eventual loss of all remaining teeth and the use of complete dentures seem inevitable. These dentures are by nature temporary and are termed transitional partial dentures. They are considered in more detail in Chapter 7.

重 点

- 不是所有的缺失牙都需要修复，它们的修复应该以患者的需求为基础，使用功能导向法。
- 功能导向法将会使可摘局部义齿的应用减少，但更有效。
- 可摘局部义齿的使用受多个因素影响，包括缺牙间隙的性质、潜在桥基牙的质量，软组织的丧失、前牙间隙以及患者的偏爱和价格。
- 可摘局部义齿的其他适应证包括用作过渡或临时修复体。

Key Points

- Not all missing teeth need to be replaced. Their replacement should be based on a perceived patient need using a functionally oriented approach.
- A functionally oriented approach will result in reduced but more effective provision of partial dentures.
- Several factors influence the use of partial dentures. These include the nature of the edentulous space, the quality of potential abutment teeth, soft tissue loss and anterior tooth spacing, patient preference and cost.
- Other indications for partial dentures include their use as interim or transitional prostheses.

拓展阅读

Further Reading

1 Jepson NJ, Allen PF. Short and sticky options in the treatment of the partially dentate

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第3章 可摘局部义齿设计的基本原则

Basic Principles of Partial Denture Design

目　的

无论对于患者还是医师，可摘局部义齿都有明显的优势。不过，义齿设计在充分发挥这些优点的同时，也要注意减小其可能造成的伤害。本章旨在建立可摘局部义齿设计的主要原则，以期有助于满足这两个目的。

Aim

Partial dentures present clear advantages to both patient and clinician. However, partial denture designs that try to maximise these benefits also should attempt to minimise the potential for harm. This chapter aims to establish broad guidelines for the design of partial dentures that go some way in satisfying both these objectives.

要　点

阅读本章后，从业医师应该清楚可摘局部义齿设计的基本原则，从而最大限度地保持义齿的功能性稳定，同时减少其对余留牙和支持软组织引发长期伤害的倾向。

Outcome

After reading this chapter, the practitioner should be aware of the principles of partial denture design that aim to maximise the functional stability of the denture and, at the same time, reduce the propensity of partial dentures to cause long-term harm to the remaining teeth and supporting soft tissues.

可摘局部义齿的分类

可摘局部义齿用来承托替代缺失牙的部分称为鞍基。在鞍基两端的天然牙称为桥基牙。如果在鞍基两端均

Classification of Partial Dentures

The part of the partial denture carrying the replacement teeth is called the "saddle". The natural teeth at the end of the saddle

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有桥基牙，则称之为有界限鞍基。如果鞍基远中端无桥基牙，则称之为无界限鞍基，远中伸展鞍基，或者是游离端鞍基。鞍基通常采用丙烯酸树脂制作，可以连接于铸造金属支架（设计为长期使用的最终义齿见图 3-1），也可以是全丙烯酸树脂义齿的一部分（用于短期使用的过渡性义齿见图 3-2）。

are termed "abutment" teeth. Where there is an abutment tooth at each end of the saddle it is termed a "bounded" saddle. Where there is no distal abutment tooth the saddle is described as "unbounded", distal extension or, more commonly, a free-end saddle. Saddles are typically made of acrylic and may be attached to a cast metal framework (definitive partial dentures that are designed for long-term use; Fig 3-1), or form a part of all acrylic dentures (transitional dentures intended for short-term use; Fig 3-2).



图 3-1 带钴铬金属支架的可摘局部义齿

Fig 3-1 A partial denture with a cobalt-chromium metal framework

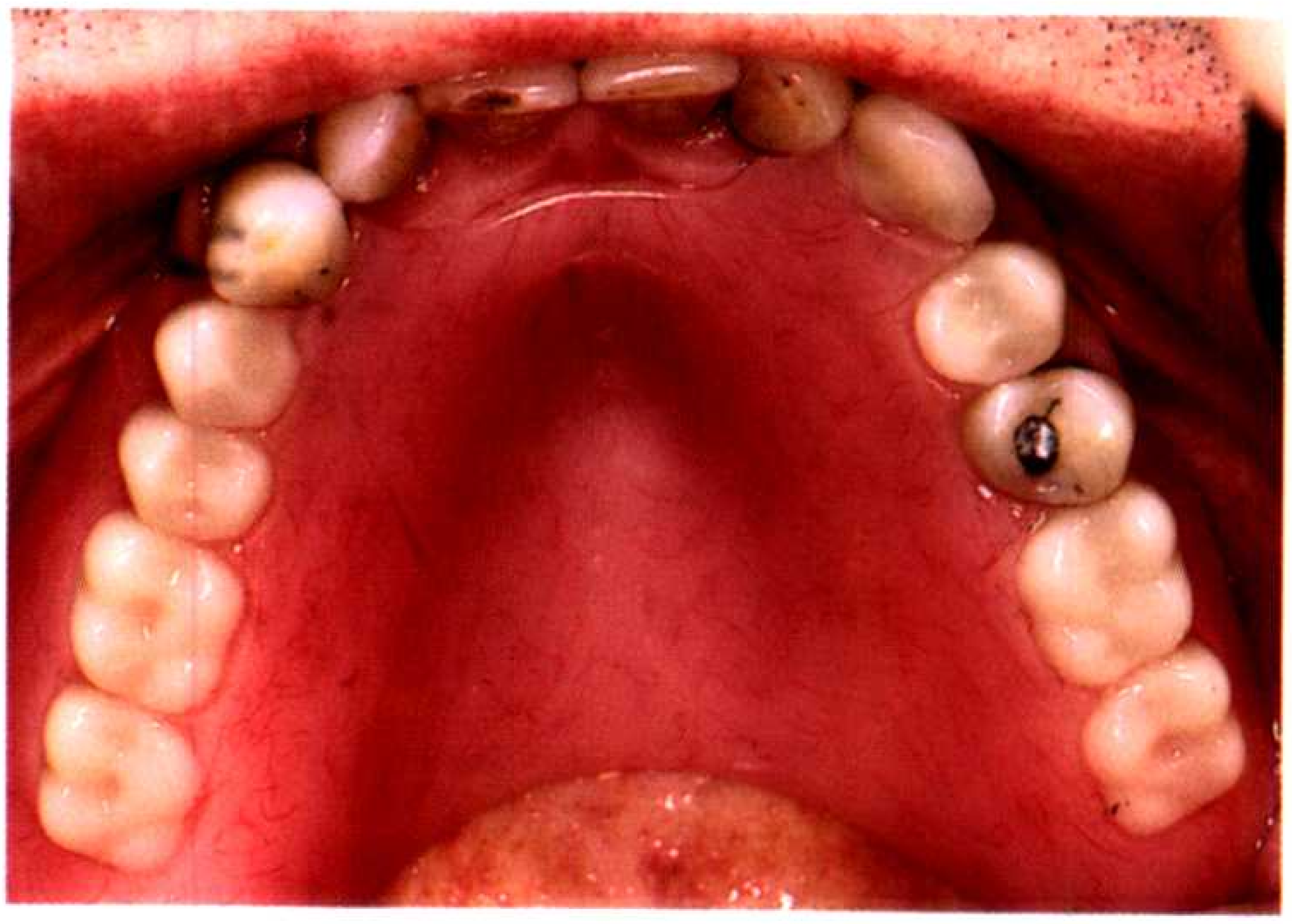


图 3-2 全丙烯酸树脂的过渡性可摘局部义齿

Fig 3-2 An all-acrylic, transitional partial denture

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考虑到缺失牙齿数目和部位的多样性，不难发现已有多种可摘局部义齿的分类方法，以及相关的专门设计。由于不容易、也无必要就每一病例采用相关的标准义齿设计方案，因而某一确定的义齿分类方法可以便利于相互交流。或许目前最知名和最被广泛应用的是Kennedy分类法，它是基于最末端缺牙区与余留牙的关系而划分的（框 3-1）。Kennedy 分类，包括部分亚类的临床示例见图 3-3。

Given the huge number of possible permutations of both the number and distribution of missing teeth, it is not surprising that several attempts have been made to classify types of partial denture and relate these to particular designs. Whilst it is neither easy nor desirable to apply standard denture designs to individual cases, a classification does provide a convenient means of communication. Perhaps the best known and widely used is the Kennedy classification that is based on the relationship of the most posterior edentulous space to the re-



图 3-3　a. Kennedy 一类一亚类；b. Kennedy 二类一亚类；c. Kennedy 三类二亚类；d. Kennedy 四类

Fig 3-3 (a) Kennedy class Ⅰ modification 1. (b) Kennedy class Ⅱ modification 1. (c) Kennedy class Ⅲ modification 2. (d) Kennedy class Ⅳ

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maining teeth (Box 3-1). Clinical examples of the Kennedy classification, including some modifications, are illustrated in Fig 3-3.

框 3-1

Kennedy 分类法

一类 *双侧的游离端鞍基*

二类 *单侧的游离端鞍基*

三类 *单侧的有界限鞍基*

四类 *鞍基集中于前牙区*

一、二、三类均可包括亚类，每个亚类表明一个增加的鞍基区域。

Box 3-1

The Kennedy Classification for Partially Dentate Mouths

Class I ***Bilateral free-end saddles***

Class II ***Unilateral free-end saddle***

Class III ***Unilateral bounded saddle***

Class IV ***Saddle anterior to the standing teeth***

Classes I–III are subdivided into modifications, each modification denoting an additional saddle area.

功能状态下的设计和稳定

对有效行使功能的可摘局部义齿而言，抵御使用中移位的力量很重要，也就是说必须在功能状态下保持义齿的稳定。施加于义齿上的力量主要来自于咀嚼和紧咬时的垂直力，以及相关但稍弱的侧向力。此外，当吞咽和说话时，来自于舌、颊和唇部的力量也可使义齿出现侧向和近远中向的移位。最后，食物团块的黏附力和重力（上颌义齿）也可导致义齿脱离组织。需要义齿在功能状态下确保稳定的设计要点概括见框 3–2。

Design and Stability in Function

For a partial denture to function effectively it is essential that the denture resists the forces that will try to displace it during use – meaning, it should have "stability in function". The major force acting on the denture is vertical loading during mastication and clenching with associated, but smaller, lateral forces. Pressure from the tongue, cheeks and lips will additionally tend to displace the denture laterally and anteroposteriorly during swallowing and speech. Finally, adherence of replacement teeth to the food bolus and gravity (in the

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upper jaw) will tend to displace the denture away from the tissues. Design features needed to ensure stability in function are summarised in Box 3-2.

框 3-2

保持功能状态下的稳定：设计准则概括

组件提供足够的支持、固位和环抱

可能时通过支托采用牙支持

黏膜支持鞍基应尽可能扩展

连接体、支托和环抱组件应该为刚性

天然牙和(或)义齿之间双侧同时𬌗接触

Box 3-2

Stability in Function: Summary of Design Criteria

Components giving adequate support, retention and bracing

Tooth support via rests when possible

Mucosally supported saddles should have wide extensions

Connectors, rests and bracing components must be rigid

Simultaneous bilateral occlusal contacts between natural or prosthetic teeth

咀嚼和紧咬时的垂直力通过支撑义齿的软硬组织－即义齿支持－传递到下方的骨组织。这可能表现为剩余牙牙周膜的张应力（牙支持），直接通过黏膜支持的压应力（黏膜支持），或者是两者均有（图3-4）。所有可摘局部义齿都会采用以上三种方式中的一种。支持组织抵御咀嚼力的能力随着支撑面积的增加而增大。支持力越大，义齿穿透食团时就越有效。健康牙牙周膜提供的支持力比牙齿拔除后剩余牙槽嵴的支持力要大3～4倍。而且，骨对张应力的反应较压应力更好。因而，在

The vertical loads of mastication and clenching are transmitted to the underlying bone via the hard and soft tissues on which the denture rests — the denture support. This may be tensile loading by way of the periodontal membranes of the remaining natural teeth (tooth support), compressive loading acting directly through the mucosa (mucosal support) or both, tooth and mucosal support (Fig 3-4). All partial dentures fall into one of these three categories. The ability of the supporting tissues to withstand masticatory loading in-

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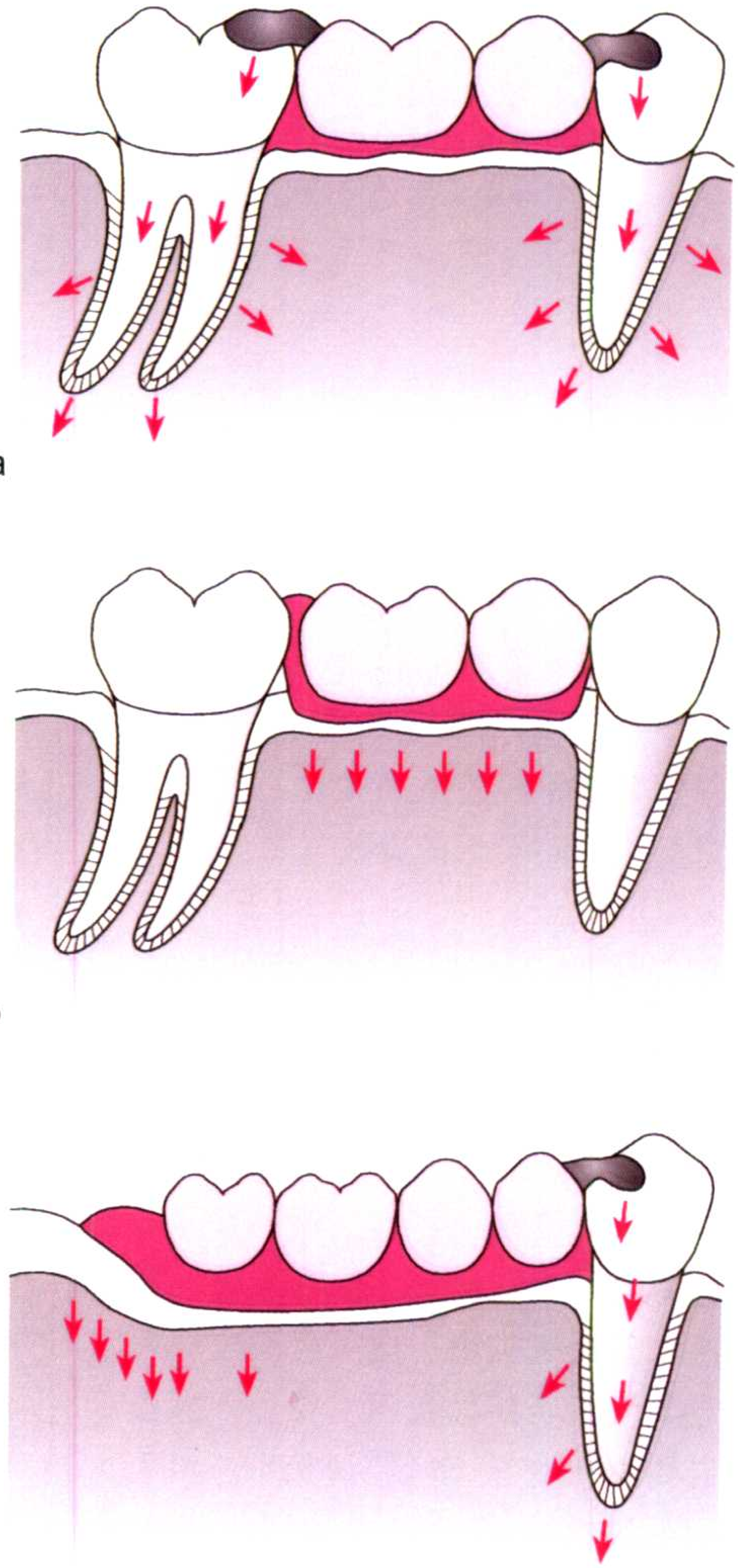

a
b
c

图3-4　可摘局部义齿的支持类型。a. 通过支托采用牙支持时，垂直力经由牙周膜在支持骨组织中产生张应力；b. 通过义齿鞍基的黏膜支持在骨组织中产生压应力；c. 在游离端鞍基时既有张应力又有压应力

Fig 3-4　Types of available support for partial dentures, (a) Tooth support via rests illustrating the resulting tensile loading of the supporting bone as vertical loading is directed via the periodontal membrane, (b) Compressive loading of the underlying bone resulting from mucosal support of the denture saddle. (c) Combination of tooth and mucosal support seen in free-end saddle dentures

可能情况下应尽量采用牙支持。

creases with the area of available support. The greater the support, the more effective are the replacement teeth in penetrating the food bolus. The area of support offered by the healthy periodontium of a tooth is three to four times greater than that available

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from the residual ridge should that tooth be extracted. In addition, it is said that bone reacts more favourably to tensile rather than compressive loading. For these reasons tooth support should be used whenever possible.

计划采用牙支持时，应当考虑到义齿的数目和分布，桥基牙的状况以及牙周膜的健康。根据经验，桥基牙应该能支撑自身的咀嚼负荷加上1.5个义齿的咀嚼负荷。尖牙和第一、二磨牙可以提供较好的支持，而下颌切牙、上颌侧切牙提供的支持较弱，不过在罹患牙周病时要略做更改（图3-5）。

When planning for tooth support, consideration should be given to the number and distribution of the denture teeth, the nature of the abutment teeth and the health of their periodontium. As a rule of thumb, an abutment can carry its own masticatory load plus that of one and a half replacement units. Canines and first and second molars provide good support whereas lower incisors and upper lateral incisors are likely to offer poor support, although this is modified in the light of past periodontal disease (Fig 3-5).

当牙支持不够时，就要设计增加组织支持，此时应尽量注意减少施加在组织上的力量。这可以通过尽可能增加义齿组织面面积、减数和减径而获得（图3-6）。当然，这也是应用于并可能源自于全口义齿制作中的修复技术。最后，如果需要提高义齿的咀嚼功能，必须在一个可接受的殆面高度下保证天然牙和义齿之间双侧同时接触。对大多数患者而言，这与其稳定的最大牙间接触位一致（图3—7）。

Where tooth support is considered inadequate then additional tissue support should be planned. When tissue support is used an attempt should be made to reduce the load acting on the tissues. This may be achieved by extending the fitting surface of the denture as widely as possible and by reducing the number or the width of the teeth on the denture (Fig 3-6). This is, of course, good prosthodontic practice as is applied in, and probably derived from, complete denture construction. Finally, if the replacement teeth are to improve masticatory function it is necessary that they provide bilateral

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and simultaneous contact between natural and prosthetic teeth at an acceptable occlusal face height. For most patients this will coincide with an existing stable position of maximum intercuspation (Fig 3-7).



图 3-5　牙支持情况评价。a. 尖牙和磨牙为有界限鞍基通过良好的牙支持；b. 倾斜磨牙和侧切牙不大可能为较长的有界限鞍基提供足够的牙支持，需要通过黏膜支持来加强。右侧的游离端鞍基最好同时采用牙支持和黏膜支持

Fig 3-5　Assessment of tooth support, (a) The canines and molars will provide excellent potential tooth support for the bounded saddle, (b) The tilted molar and lateral incisor are unlikely to offer adequate tooth support for this long bounded saddle and this should be augmented by mucosal support. A combination of tooth and mucosal support is the best that can be achieved for the free-end saddle on the right



图3-6　当采用黏膜支持时运用基本修复原则尽可能扩展鞍基

Fig 3-6　Use of the basic prosthodontic principle of broad extensions when mucosal support is required



图3-7　可摘局部义齿的𬌗接触应符合并加强最大牙间接触位

Fig 3-7　Occlusal contacts of partial dentures designed to coincide with and reinforce an existing intercuspal position

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抵御使义齿脱离组织的力（即固位力）取决于几个因素。其中，对所有类型的活动义齿而言，患者对义齿的肌肉控制力，以及义齿组织面与黏膜组织紧密接触产生的物理黏附力和内聚力都是共同的。它们是义齿长期稳定固位的重要因素。然而，许多可摘局部义齿仍然需要进一步的机械固位。这由直接和间接固位体来提供。直接固位体提供抵御义齿沿预计的脱位道脱位的力量。间接固位体则行使防止义齿旋转脱位（例如游离端鞍基义齿）的功能。

很难限定某一义齿究竟需要多少固位力。这大致与鞍基的大小、数目和形式有关：如长鞍基较短鞍基需要更多固位力；有界限鞍基较游离端鞍基需要较少固位力。而且，通常可以观察到在若干年以后虽然固位体已经失效了，但患者并未抱怨义齿过松（图3-8）。这也强调了长期使用义齿后患者肌肉控制的重要性。假如直接固位体最初是有效的，则实践中很少需要2个以上的直接固位体。

Resistance to forces tending to displace the denture away from the tissues–denture retention–is dependent upon several factors. Of these, muscular control of the denture by the patient and the physical forces of adhesion and cohesion developed by the close adaptation of the fitting surface of the denture to the underlying tissues are common to all types of removable prosthesis. In the long-term, they are the significant factors for successful retention. However, for many partial dentures there is a need for further mechanical retention. This is provided by direct and indirect retainers. Direct retainers offer resistance to movement of the denture away from the tissues along its planned path of withdrawal. Indirect retainers act to prevent rotational displacement of the denture away from the tissues as, for example, in the free-end saddle denture.

How much retention is required of a given denture is difficult to define. It is presumably related to the size, number and type of saddles, i.e. longer saddles require more retention than shorter saddles, and bounded saddles less retention than free-end saddles. In addition, it is a common observation that retainers are ineffective after some years and yet the patient does not complain that the denture is loose (Fig 3-8). This emphasises the importance of the patient's muscular control in the long-term.

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图 3-8　可摘局部义齿的固位。a. 尽管3| 上的卡环作用不大，但患者对可摘局部义齿的固位并无抱怨；b. 两个设计良好的卡环可以确保可摘局部义齿的固位

Fig 3-8 Partial denture retention, (a) Despite the ineffectiveness of the clasp on LR4 the patient had no complaint about the retention of the partial denture, (b) Two well-designed clasps will ensure adequate retention for this partial denture

Assuming their initial effectiveness, in practice there is rarely a need for more than two direct retainers.

据认为，侧方脱位力对牙齿支持结构和剩余牙槽嵴的潜在破坏最大，故建议广泛分配抵御力，这种抵御力称之为环抱作用。和支持作用一样，牙齿提供了最好的环抱作用，其次为无牙颌牙槽嵴或者腭部组织（图 3-9）。

Lateral displacing forces are said to be potentially the most damaging to the supporting structures of the teeth and the residual ridge and a wide distribution of resistance is advised. This resistance is termed bracing. As with support, teeth offer the best resistance and tissues of the edentulous ridge or palate less so (Fig 3-9).

要想传递负荷到牙齿的义齿组件们有效地行使功能，它们本身必须保持刚性，并且通过刚性的连接体与鞍基和其他组件连接起来。

For components transmitting loads to teeth to act effectively, they must themselves be rigid and joined to the saddles and other components by rigid connectors.

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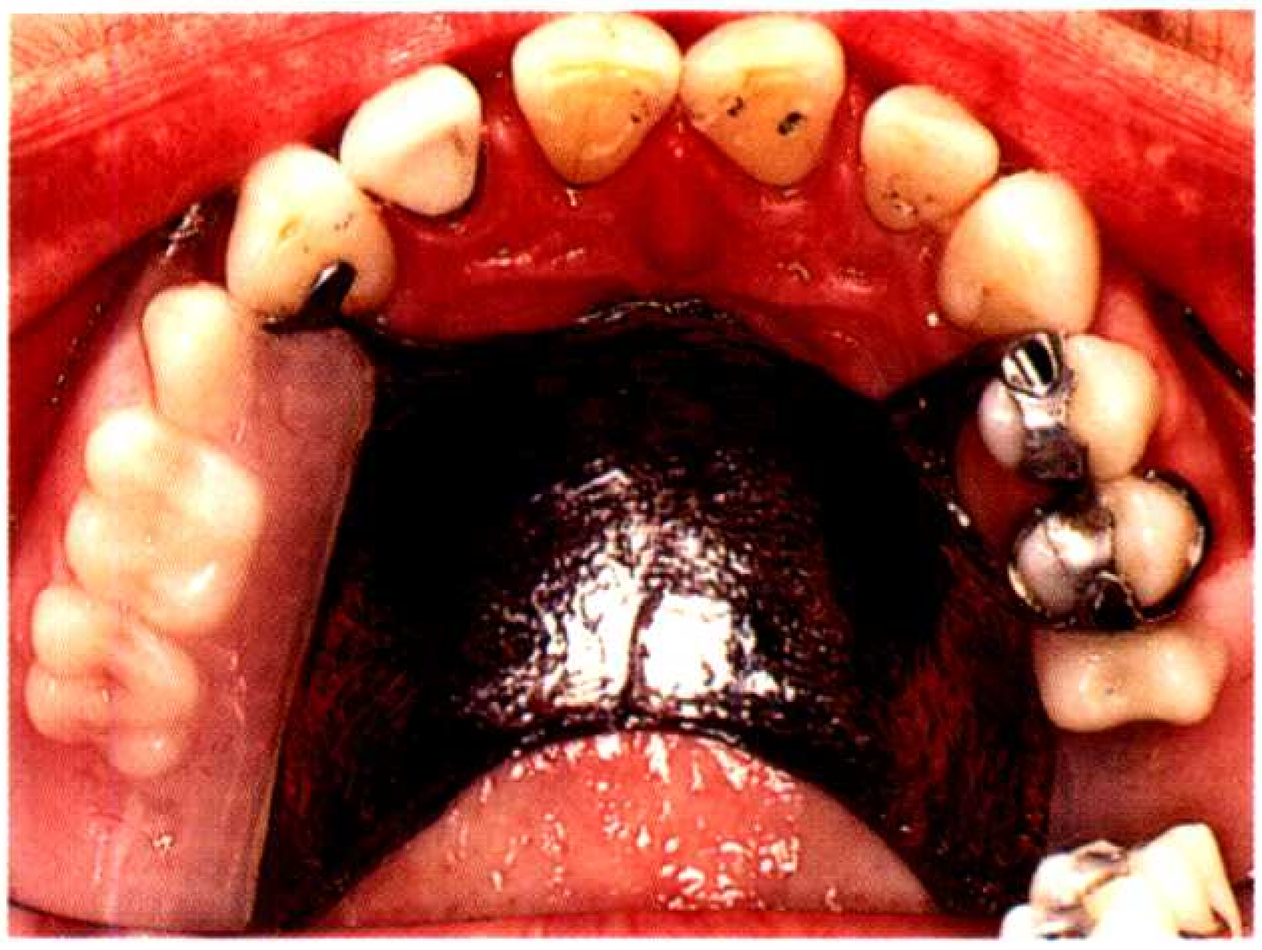


图3-9 小连接体、卡环对抗臂、舌支托和基托翼缘都有助于可摘局部义齿的环抱稳定，其效果通过大连接体的刚性得以确保

Fig 3-9 Minor connectors, clasp reciprocal arms, cingulum rest and flanges of the denture saddles will all contribute to bracing for this partial denture. Their effectiveness is ensured by the rigid palatal major connector

有害影响的设计和预防

很明显，有效的菌斑控制是预防龋病和牙周病发病率增加的最重要因素。不过，某些设计原则也有助于减少这些有害的影响。其要点概括见框3-3。

框 3-3

有害影响的预防：设计准则概括

避免不必要的牙龈覆盖

当牙龈覆盖时采用牙支持

设计简单化

充分扩展黏膜支持式鞍基

牙龈覆盖尤其与菌斑的增加相关，在任何可能情况下都应该避免（图3-10）。如果实在不能避免，则覆盖牙龈

Design and the Prevention of Harmful Effects

Clearly effective plaque control is the most important factor that prevents a long-term increase in the incidence of caries and periodontal disease. However, certain principles of design help minimise harmful effects. These are summarised in Box 3-3.

Box 3-3

Prevention of Harm: Summary of Design Criteria

Avoid unnecessary gingival coverage

Tooth support when gingivae are covered

Simplicity of design

Full extension of mucosally supported saddles

Gingival coverage, in particular, is associated with increased plaque formation and should be avoided whenever possible (Fig

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的义齿应该为牙支持，以最大减小牙龈负荷。如果不能提供这个支持，则义齿就位时将导致其下的牙龈受损。如果仅缓冲牙龈边缘而无足够的牙支持，则可能导致牙龈组织向该缓冲间隙的增生。

3-10). Where this is not possible, then the part of the denture covering the gingiva should be tooth-supported and minimally relieved at the gingival sulcus. Failure to provide this support simply results in trauma to the underlying gingival tissues as the denture is displaced in function. Relief of the gingival margins without adequate tooth support results in the proliferation of gingival tissues into the space.

义齿的设计应该简单、自然。许多可摘局部义齿组件可以在不影响义齿恢复功能的情况下加以去除（图 3-11）。如前所述，个人的临床观点认为良好伸展的黏膜支持式鞍基倾向于减少吸收性改变。

The design of the denture should be as simple as compatibility with function. Many partial denture components can be eliminated without endangering the rehabilitative functions of the denture (Fig 3-11). As discussed above, subjective clinical opinion suggests that well extended mucosally supported saddles tend to reduce resorptive changes.

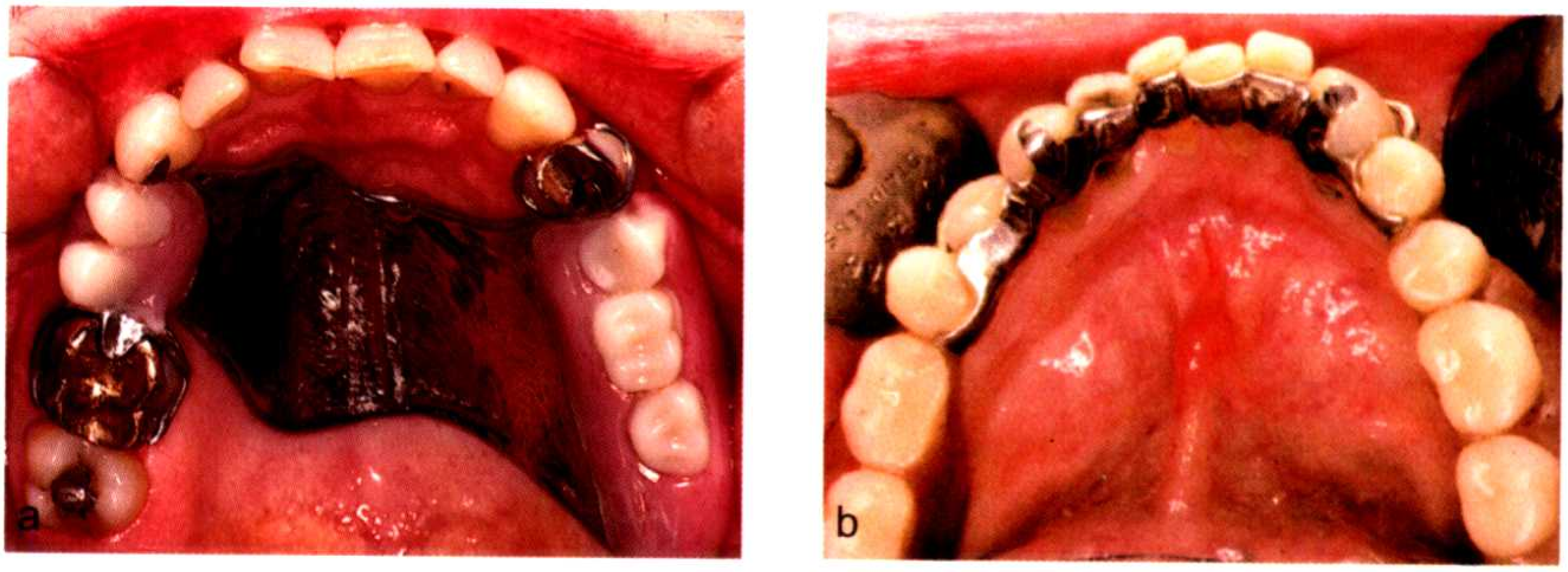


图 3-10　一例下颌可摘局部义齿病例，示意其组件设计成空出牙龈边缘。a. 上颌；b. 上颌

Fig 3-10　Examples of (a) an upper and (b) a lower partial denture where components have been designed to clear the gingival margin. (Courtesy of Prof. B. Öwall.)

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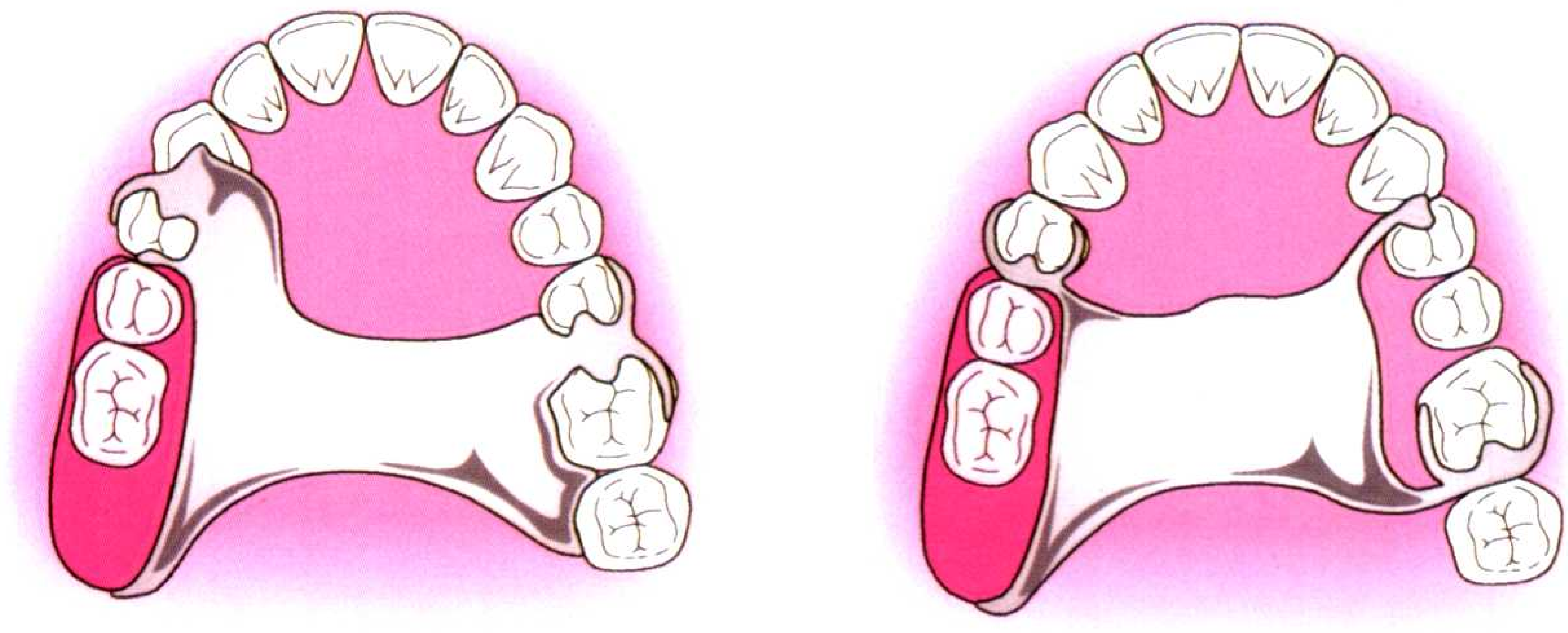


图 3-11 通过去除不必要组件以简化设计

Fig 3-11 The simplification of design by elimination of unnecessary components

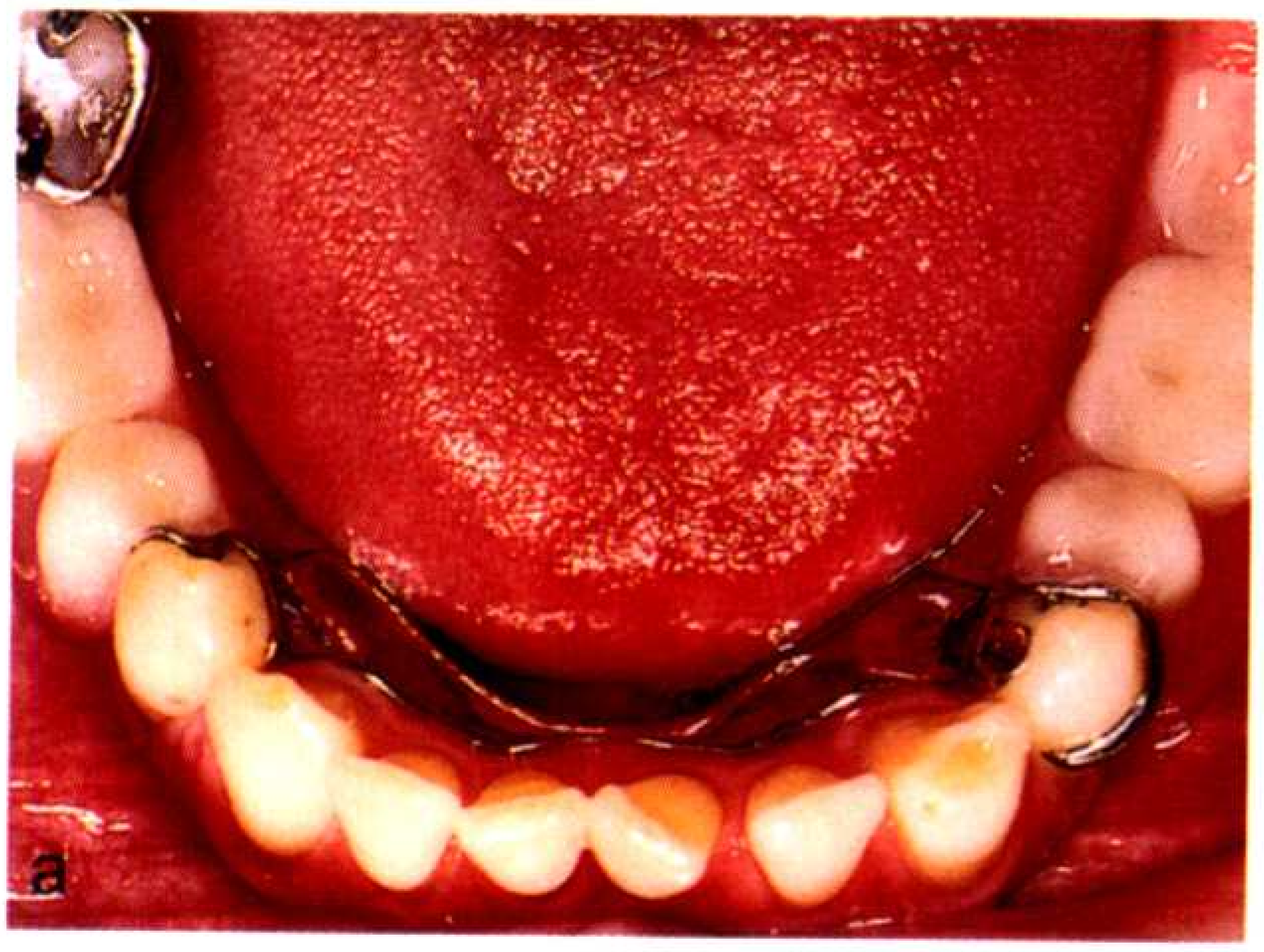
可摘局部义齿设计：现代的原则

从传统观点来看，可摘局部义齿的设计更多地集中于机械方面，以确保义齿足够的固位、稳定和耐久。那些被认为可以使义齿在功能状态下保持稳定的组件更多地出现于临床实践，而非源自一个可靠的论证基础。事实上，明显、并不断增加的证据表明：需要用来保持可摘局部义齿稳定的组件可能会导致长期有害的影响。现代的义齿设计概念则通过应用"卫生原则"来尽量解决这个冲突。这些概念强调了牙龈清洁和简化设计的必要。简化设计是指使用需要保持义齿稳定的最少数目的组件。有效的应用这些原则通常需要一个铸造合金支架。其设计见图 3-12。除了作为短期、过渡性可摘局部义齿以外，功能和物理上的缺

Partial Denture Design: Current Principles

Traditionally, the design of partial dentures has focused on mechanisms to ensure adequate retention, stability and durability of the denture. Use of the several denture components deemed necessary to ensure stability in function is founded more on pragmatic clinical practice rather than a solid evidence base. Indeed, components of a partial denture required for stability in function may contribute to a long-term harmful effect for which there is a strong and growing evidence base. Current concepts of partial denture design attempt to address this potential conflict through the application of "hygienic principles". These emphasise the need for gingival clearance and simplicity through the use of the mini-

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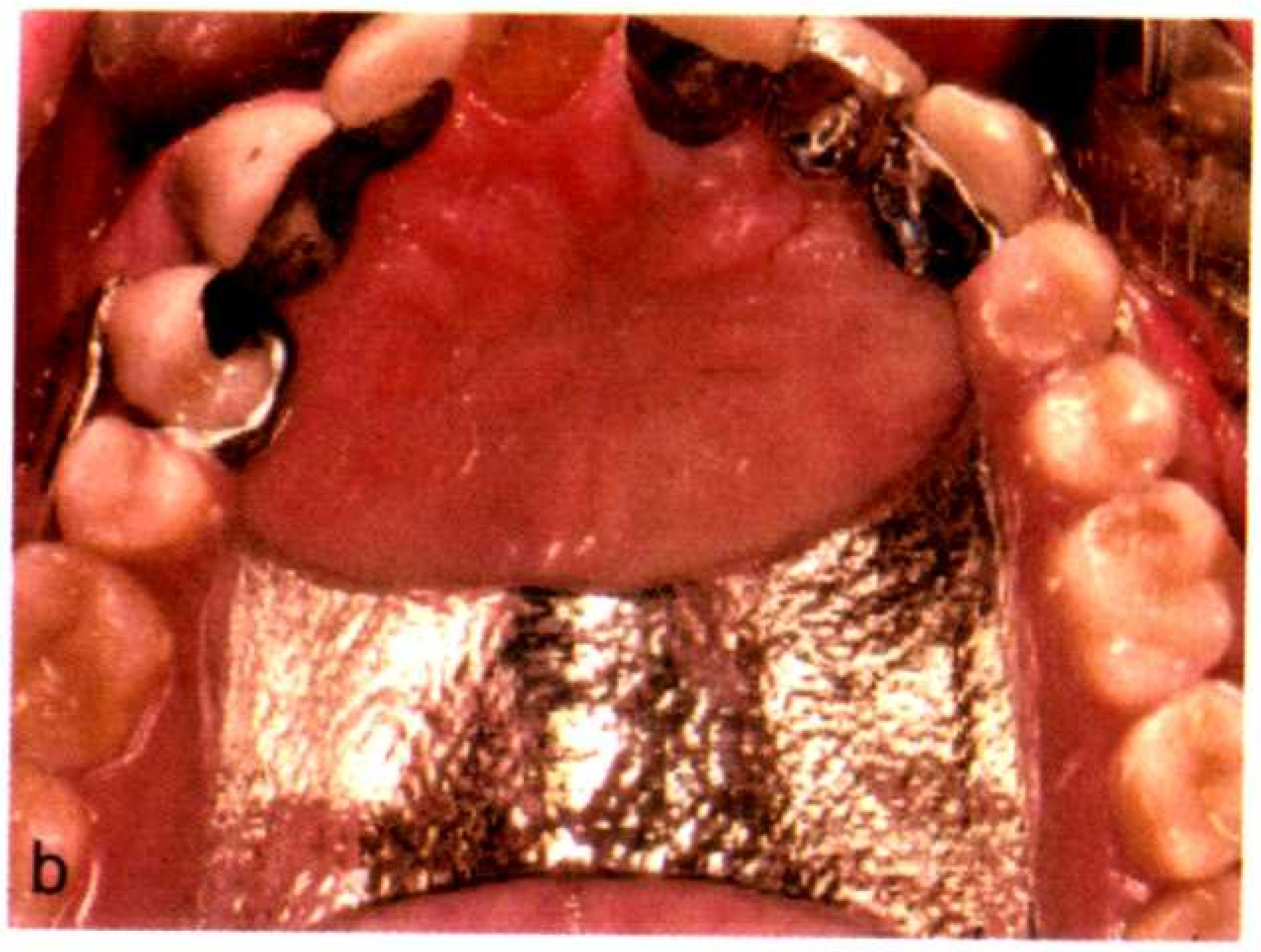


图3-12 应用现代的基本设计原则a. 一例传统可摘局部义齿；b. 一个卫生的可摘局部义齿设计（感谢B. Öwall 教授）

Fig 3-12 The application of current basic design criteria to a conventionally designed partial denture (a) and a "hygienic" partial denture design (b). (Courtesy of Prof. B. Öwall.)

点使得简单的丙烯酸树脂黏膜支持式义齿难作他用。

重 点

既可以保持功能状态下的稳定需要，又可以预防伤害的现代设计原则是：

- 避免不必要的牙龈覆盖。
- 尽可能采用牙支持，充分扩展黏膜支持的基托。
- 每个义齿采用两个固位体。
- 运用刚性连接体、支托和环抱结构。

mum number of components needed to ensure stability. Effective application of these principles generally requires a cast alloy framework and examples of such designs are illustrated in Fig 3-12. Both the functional and physical shortcomings of simple acrylic mucosal borne dentures preclude their use as anything but short-term, transitional partial dentures.

Key Points

Current design principles that address both the need for stability in function and the prevention of harm are:

- avoid unnecessary gingival coverage
- use tooth support whenever possible and wide extension of mucosally supported saddles
- use two retainers per denture
- use rigid connectors, rests and bracing

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components

- 确保天然牙和（或）修复体之间双侧同时殆接触。

- ensure simultaneous bilateral occlusal contacts between natural and/or prosthetic teeth.

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第 4 章　可摘局部义齿的设计：鞍基、支托和固位体

Partial Denture Design: Saddles, Rests and Retainers

目　的

本章将在功能稳定和预防伤害的基本设计原则下，探讨可摘局部义齿的特殊部件——鞍基、支托和固位体的设计和功能，以及如何按照"卫生"原则将这些部件结合到可摘局部义齿的设计中去。游离端鞍基可摘局部义齿的支持和固位等特殊问题也将被涉及。

Aim

This chapter will consider the design and function of the specific partial denture components — saddles, rests and retainers — in the context of the basic design principles for stability in function and the prevention of harm, and how these components can be incorporated into partial denture designs that follow "hygienic" principles. The particular problems of providing effective support and retention for free-end saddle partial dentures will also be considered.

要　点

阅读本章后，从业医师应该能认识到可摘局部义齿鞍基、支托和固位体的重要设计特点，并了解这种设计如何关联到这些可摘局部义齿部件的有效功能。

Outcome

After reading this chapter the practitioner should be able to recognise the important design features of partial denture saddles, rests and retainers and understand how this design relates to the effective functioning of these partial denture components.

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鞍　基

鞍基是义齿位于牙槽嵴组织之上并覆盖牙槽嵴组织的部分。它承载人工牙和人工牙龈。有关的设计特点是：

- 鞍基和桥基牙间的关系
- 鞍基组织面的伸展
- 组织面的材料
- 殆面的设计

鞍基－桥基牙关系

修复的牙齿与桥基牙邻面之间一般应该接触，以防止食物嵌塞。假设修复体和相邻天然牙之间没有预留空隙的美观要求，这种接触应该尽可能地设计在桥基牙的天然接触区处（图 4-1）。

Saddles

The saddle is that part of the denture that rests on and covers the tissues of the alveolar ridge. It carries the artificial teeth and gum work. The design features of relevance are the:

- relationship of the saddle to the abutment tooth
- extension of the fitting surface of the saddle
- material of the fitting surface
- design of the occlusal surfaces.

Saddle- abutment relationship

There should normally be contact between the replacement tooth and the proximal surface of the abutment tooth to prevent food packing. Where possible, this contact should be with the natural contact area of the abutment tooth (Fig 4-1). Assuming that there is no aesthetic requirement for spacing between replacement and



图4-1 人工牙的接触建立在桥基牙的天然接触区处

Fig 4-1 Contact of the replacement tooth established with the natural contact point of the abutment tooth

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桥基牙呈球状或倾斜常常导致鞍基和桥基牙邻面之间存在间隙。这种不利的倒凹区被义齿包绕以后就称为死区。一般认为死区容易导致食物嵌塞，并可能增加菌斑堆积，因而是不利的。假如出现这种问题，有两种方法解决：

- 通过改变义齿就位道或改变桥基牙形状来减小死区——形成闭合性鞍基－桥基牙关系（图4-2a）。
- 有意地扩大间隙，并减小与桥基牙相邻的鞍基颊舌径——形成开放性鞍基－桥基牙关系（图4-2b）。

adjacent natural teeth.

The natural bulbosity or tilting of the abutment tooth often results in a space between the saddle and proximal surface of the abutment tooth. This area of unwanted undercut when enclosed by the denture is termed as dead space. Since it is claimed that these dead spaces predispose to food packing and perhaps increased plaque accumulation, they are undesirable. Two solutions to this supposed problem exist:

- Elimination of the dead space by altering the line of insertion of the denture or the shape of the abutment tooth – a closed saddle – abutment relationship (Fig 4-2a).
- Deliberate enlargement of the space and a reduction of the buccolingual width of the saddle next to the abutment tooth – an open saddle-abutment relationship (Fig 4-2b).

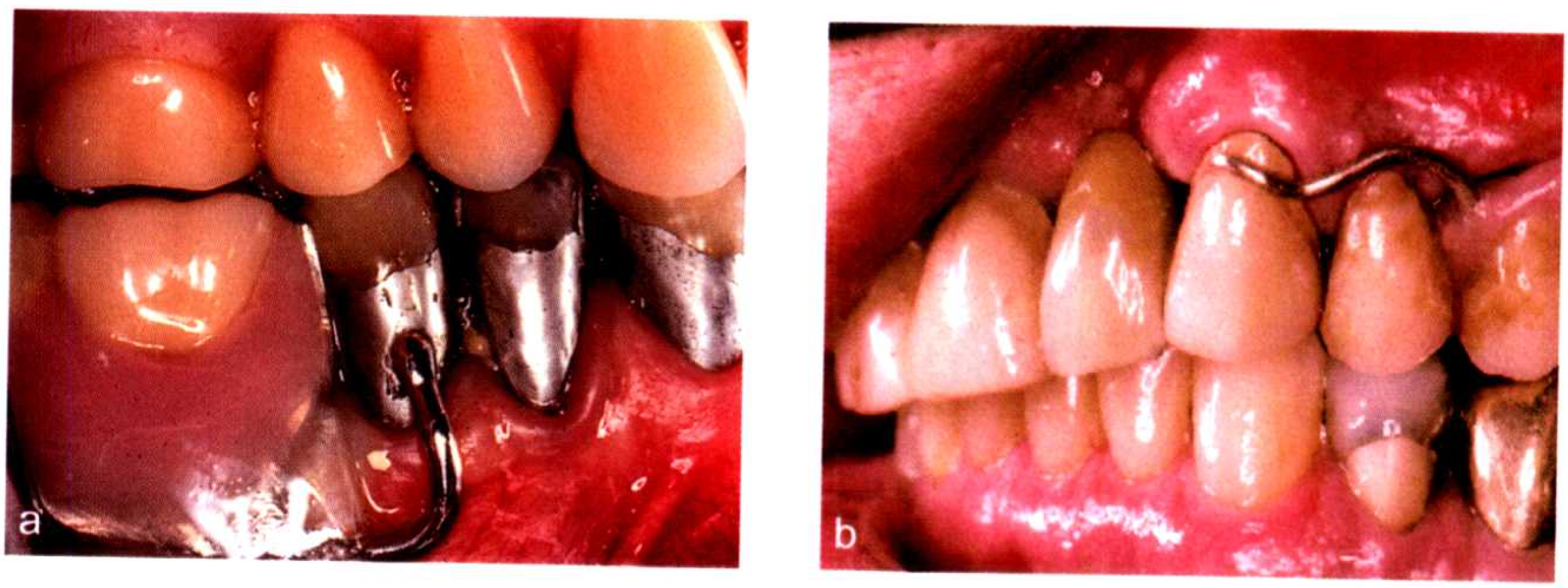


图 4-2　鞍基－桥基牙关系：a. 闭合性；b. 开放性（感谢 B.Öwall 教授）

Fig 4-2　Closed (a) and open (b) saddle-abutment relationships. (Courtesy of Prof. B. Öwall.)

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后者较符合避免覆盖牙龈的要求，并且确实有证据表明这种方法更有益于牙龈健康。然而，口腔前部的空隙可能使义齿外观令人难以接受。使用闭合性设计时，可以采用牙支持和对龈沟处略作缓冲来避免龈组织创伤。

The latter approach better conforms to the requirement of avoiding gingi-val coverage and indeed there is evidence to suggest that this is more conducive to gingival health. However, spacing towards the front of the mouth may result in an unacceptable appearance. When a closed design is used, trauma to the gingival tissues can be prevented by providing both tooth support and slight relief of the gingival sulcus.

组织面的伸展

组织面的伸展在很大程度上取决于鞍基需要义齿产生的支持力。如果计划采用黏膜支持，就要采用最大化伸展的设计原则。这不但适用于黏膜支持式义齿，而且同样适用于牙/组织混合支持的游离端鞍基义齿（图4-3）。

Extension of the fitting surface

Extension of the fitting surface is largely dependent upon the contribution the saddle is to make to the support of the denture. Where mucosal support is planned the design principle of maximum extension should be applied. This is clearly the case for simple mucosal borne dentures but applies equally to tooth/tissue supported free-end saddles (Fig 4-3).

牙支持的有界限鞍基义齿的设计就不那么清楚。当单纯的牙支持可以

The design of tooth-supported bounded saddles is less clear. When tooth support

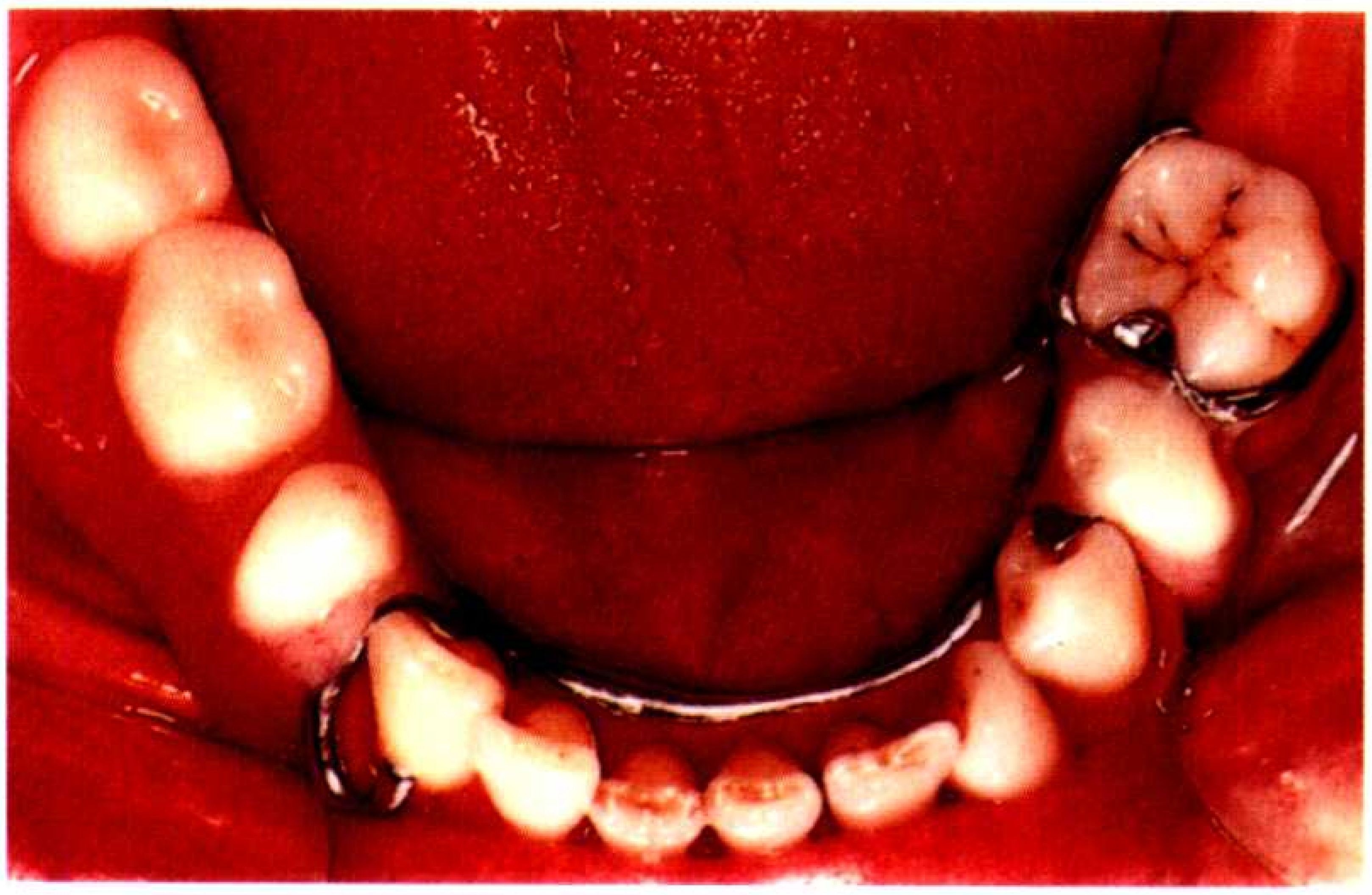


图4-3 广泛扩展游离端鞍基，但减小短的有界限鞍基

Fig 4-3 Broad extension of the free-end saddle. Extension of the short bounded saddle has been minimised

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胜任时，通常见于短的后牙有界限鞍基，就不需要大面积的黏膜覆盖。鞍基的显著减小以及开放性鞍基－桥基牙关系具有增加舌、颊活动自由度，避开龈缘的优点。长的有界限鞍基和（或）桥基牙支持力弱的鞍基一般需要增加组织支持以及最大范围地伸展基托。在这种情况下，颊舌基板作为环抱部分可能在对抗水平脱位力时发挥重要作用。

alone is adequate, as is often true of short posterior bounded saddles, there is no need for broad mucosal coverage. A marked reduction in saddle size with an "open" saddle — abutment relationship offers the further advantages of increased freedom of movement for the tongue and cheeks, and avoidance of the gingival margin. Long bounded saddles and/or saddles with abutment teeth of poor support generally require additional tissue support and the maxim of wide extension again applies. In this context the buc-cal and lingual flanges may be important in resisting horizontal displacing forces by acting as bracing components.

前牙鞍基的设计通常以美观要求为指导原则，要避免修复体和邻牙之间的死区，采用"闭合"式设计。前牙区无牙牙槽嵴有明显的骨缺失时，需要设计唇基板以补偿骨缺失，恢复正常外貌。相反，骨吸收轻微或者唇侧倒凹较深时使用唇基板会导致唇部过于丰满，外观不佳（图4-4），此时尽管具有功能上的优点，如对抗义齿后移和旋转脱位力，也不要采用唇侧基板。使用唇基板时，其伸展量只需要保证其上缘能被唇部覆盖即可。

The design of anterior saddles is normally dictated by aesthetic requirements. Dead spaces between replacement and adjacent teeth should be avpided and a "closed" design used. Where there has been considerable bone loss of the anterior edentulous ridge, a labial flange will be necessary to replace this loss and restore a normal appearance. In contrast, a labial flange where only slight resorption or a deep labial undercut is present 'will tend to result in an overfull lip and poor appearance (Fig 4-4). Such a decision will be made despite the undoubted functional advantages, i.e. resistance to backward and rotational displacing forces. When a labial flange is used, its extension need only be the amount necessary to ensure concealment of its upper

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图4-4 前牙鞍基设计。a. 唇基板和封闭式鞍基－桥基牙关系；b. 轻微吸收和唇侧倒凹过深妨碍了唇基板的使用

Fig 4-4 The design of anterior asddles.(a)A labial flange and a closed saddle-abutment relationship.(b)Minimal resorption and persistence of deep labial undercut preventing the use of a labial flange

edge by the lips.

殆面的设计

修复的人工牙应该与对颌牙双侧同时接触。如果设计组织支持式义齿，就要限制殆面面积，使人工牙容易穿透食团，从而减轻支持组织上的咀嚼压力。减少后牙的宽度和数量可以达到这种效果。减小殆面面积在下颌游离端鞍基义齿中尤为重要，这样可以增加舌活动空间，帮助控制义齿（图4-5）。

Design of the occlusal surface

Replacement teeth should be positioned to allow bilateral, simultaneous contact with opposing teeth. When tissue support is planned, limiting the area of the occlusal table reduces the masticatory loads on the underlying tissue by improving the ease of penetration of the food bolus by the teeth. This is achieved by using narrow posterior teeth and reducing their number. This is of particular importance in the lower free-end saddle denture where it has the added advantage of providing more space for the tongue to control the denture (Fig 4-5).

组织面的材料

鞍基组织面可以用树脂或者金属制作。树脂的优点是能够容易地增加

Material of the fitting surface

The fitting surface of the saddle can be constructed in acrylic or metal. The advan-

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或修改，适用于将来可能发生牙槽嵴进一步吸收的患者。游离端鞍基义齿通常就是这样。树脂基托通过有缓冲的铸造网状结构与金属支架相结合。

金属基板构成了金属支架中不可缺少的一部分，它与支持软组织紧密地贴合。它的使用为人工牙留下了更多的空间，通常会使前牙区外形更好。通过作为支架一部分铸造的固位指或固位钉，可将人工牙和相邻的基托固定在金属基板上。这些固位钉通常放置于人工牙下方或里面（图 4-6）。

tage of acrylic is that it may be easily added to or modified and its use is advisable when further resorption of the alveolar ridge is expected. This is normally the case with free-end saddle dentures. The acrylic base is joined to the metal framework by way of a spaced meshwork cast as a part of the framework.

A metal base forms an integral part of cast metal framework and closely fits the supporting soft tissues. Its use leaves more space for the replacement teeth and this often results in better appearance anteriorly. The replacement teeth and associated gum work are retained on the metal base by means of retention tags or studs cast as a part of the framework. These are positioned



图4-5　减小的殆面降低了咀嚼压力并使舌有足够的活动空间来控制游离端鞍基

Fig 4-5　A limited occlusal table to reduce masticatory loads and allow space for control of the free-end saddle with the tongue

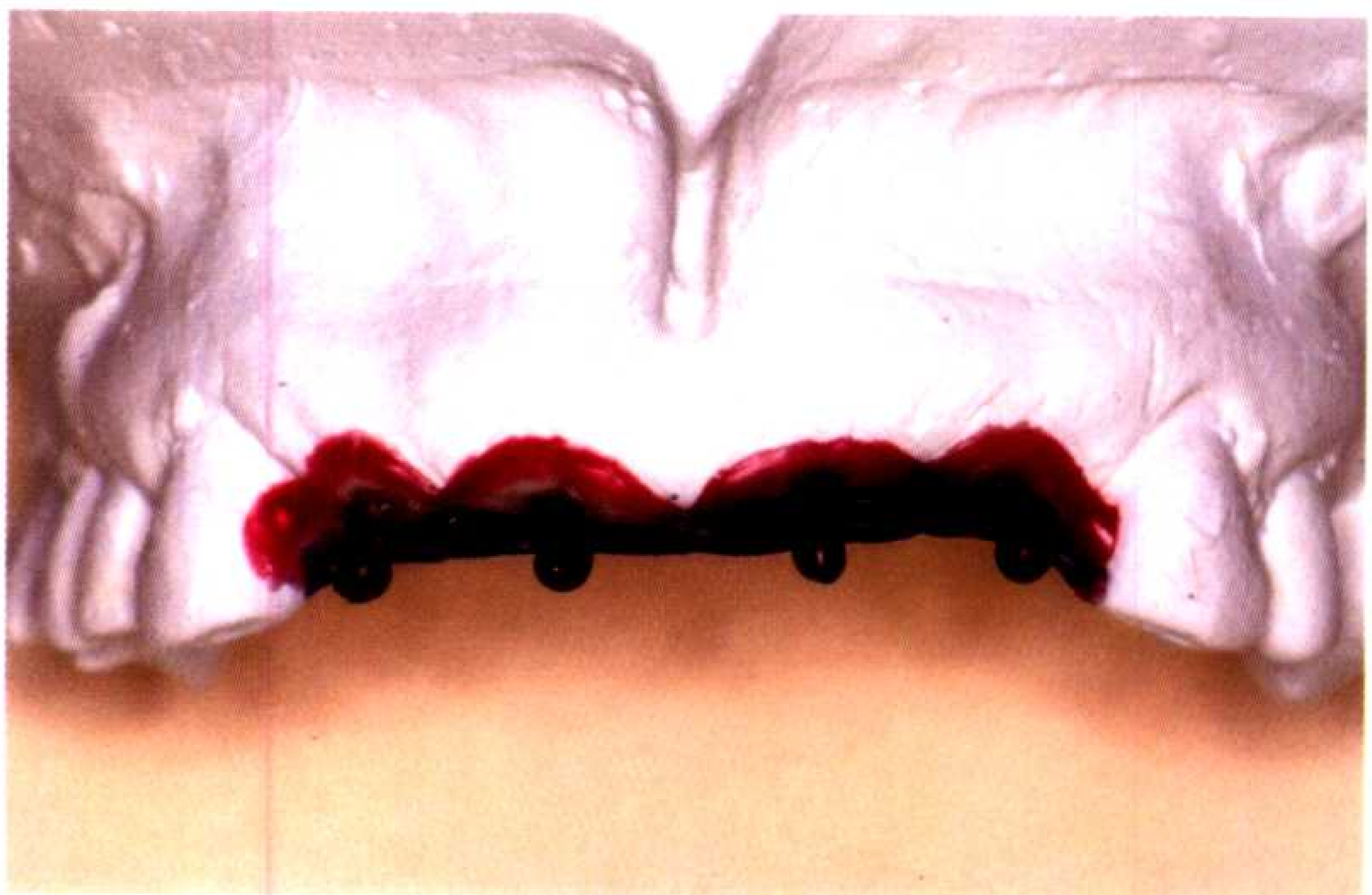


图 4-6　与组织面贴合的金属支架蜡型上用于固定人工牙的固位钉

Fig 4-6　Studs to retain the replacement teeth positioned for the wax-up of a tissue fitting metal framework

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to lie beneath and within the artificial teeth (Fig 4-6).

支　托

应尽可能多地使用支托来形成牙支持。支托就是附着在义齿上、延伸到殆面或制备的牙面上的简单金属突起。它们通常被作为金属支架的一部分铸造而成。支托可以放置在健康的釉质上，或者放置在直接或间接充填体上，尽管放在直接充填体上因为相对脆弱，最不理想。

Rests

Tooth support through the use of rests should be used wherever possible. Rests are simply metal projections attached to the denture that extend onto the occlusal or prepared tooth surfaces. They are normally cast as a part of a metal framework. Rests may be placed upon sound enamel, or on direct or indirect restorations although the use of direct restorations is the least desirable because of their comparative weakness.

支托的作用：

- 传递轴向负荷给牙齿
- 引导食物离开鞍基－桥基牙结合处
- 当支托做成高嵌体时可改善殆
- 作为间接固位体和作为大连接体的辅助支持

Rests serve to:

- transmit axial loads to a tooth
- deflect food away from the saddle-abutment tooth junction
- improve occlusal contacts when used as onlays
- act as indirect retainers and as auxiliary support for major connectors.

支托向牙齿传递殆力的能力存在争议。有研究发现牙支持式义齿紧在咬牙时的平均负荷大概是天然牙的一半，这显示了支托并不是特别有效。没有可靠的证据证实一个支托的设计或位置比其他支托更有效。对这些理论进行临床检验的结果也不多见，并且互相矛盾，可能的临床价值有限。实际情况是只要利用一个可用的桥基牙，即使其牙周状况极差，也可以提供有

The ability of rests to transmit occlusal loads to the tooth is debatable. Findings that the mean clenched load on tooth-borne dentures is approximately half that on natural teeth suggest that they are not particularly effective. There is no convincing evidence to suggest that one design or position of a rest is more effective than any other. Clinical testing of such theories has been infrequent, contradictory and is possibly

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用的支持力。如果这种支持不够时，就应该修改为牙和（或）黏膜支持。

of limited clinical value. Pragmatically one simply uses the abutment teeth available, even severely periodontally weakened teeth can provide useful support. When this support is considered inadequate it should be augmented with additional tooth and/or mucosal support.

框 4－1 是支托的设计指导方针。对支托的要求，尤其是刚硬和（与）现有殆相协调，需要在桥基牙上为支托制备一定的空间。即使在空间不成问题的地方，支托凹的预备也可以让技师明确支托设计的位置和范围。

Design guidelines for rests are listed in Box 4-1. The requirements of, in particular, rigidity and conformity with the existing occlusion generally require preparation of the abutment tooth to create space for the rest. Even where space is not a problem, rest seat preparations give a clear indication to the technician of the intended position and extent of the rest.

支托有好几种，图4-7列出了一些例子。

There are several types of rest. Some examples are illustrated in Fig 4-7.

框 4-1

支托的基本特征

刚硬

不干扰现存的牙尖交错殆和侧方殆

外形圆滑以方便功能性运动

Box 4-1

Essential Features of Rests

Rigidity

Non-interference with existing intercuspal and lateral occlusion

Rounded to permit movement in junction

后牙支托—— 殆支托

殆支托就像一个茶匙。它在边缘嵴处最宽，向附近的殆面窝处逐渐缩窄。支托最深的部分应与垂直的小连

Rests in posterior teeth – occlusal rests

The occlusal rest can be likened to a saucered spoon. It is broadest at the marginal ridge and tapers down into the adja-

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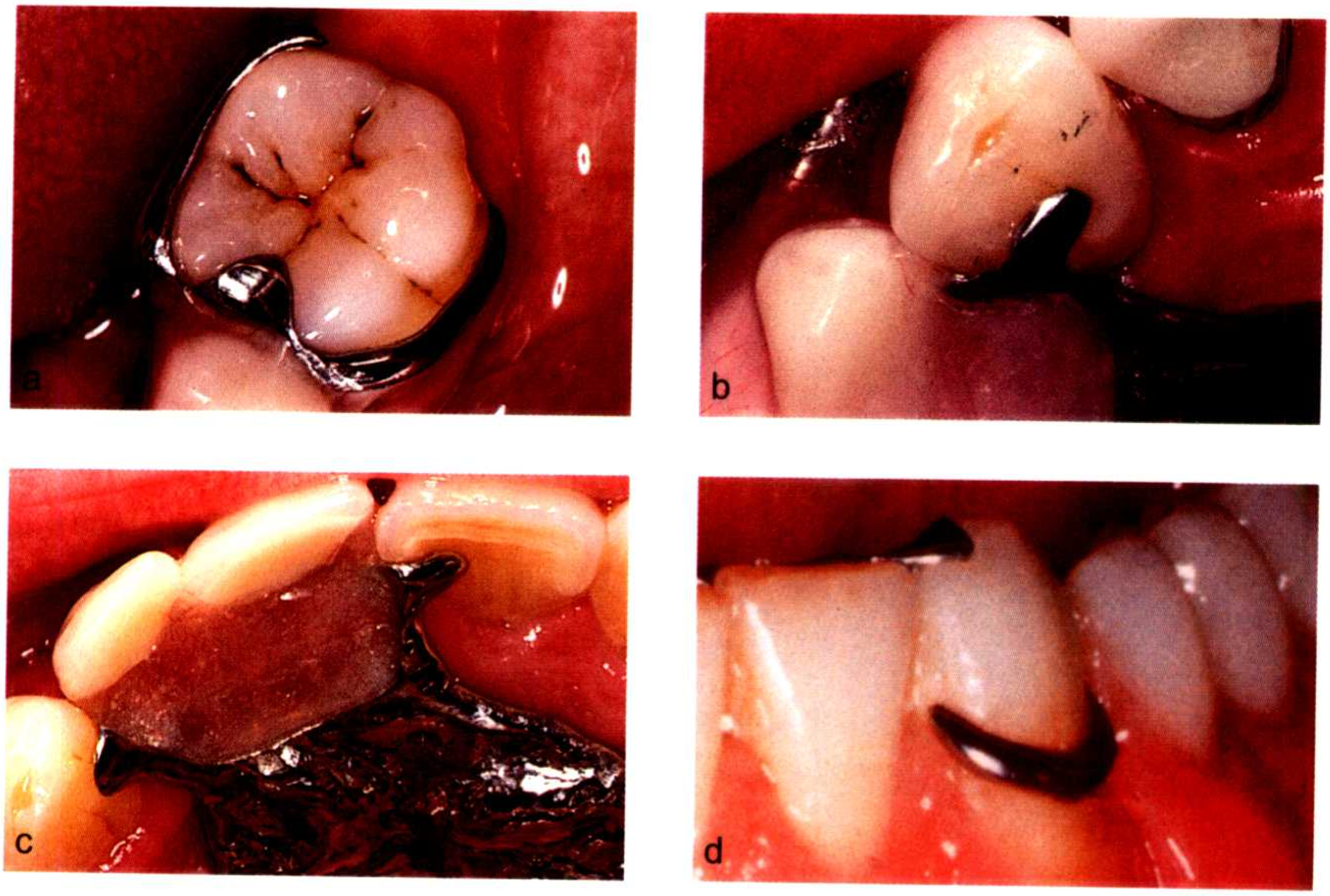


图 4-7 各种支托：a. 殆支托；b. 舌隆突支托；c. 边缘支托；d. 切支托

Fig 4-7 Rests: (a) occlusal, (b) cingulum, (c) marginal and (d) incisal

接体形成小于 90° 的夹角，这样可以保证正确地放置支托。支托应该有一定的厚度以保证其硬度。

前牙支托

舌隆突支托

通常是与尖牙或上颌切牙上已制备的或扩大的舌隆突相吻合。支托可能占用舌隆突的整个宽度或其近中或远中的一半，当限定在边缘嵴时称为"边缘支托"。

cent fossa. The deepest part of the rest should form an angle of less than 90° with the vertical minor connector. This ensures positive seating of the rest. It should be of a thickness that ensures rigidity.

Rests in anterior teeth

Cingulum rests

These are designed to fit the prepared or augmented cingulum of usually a canine or maxillary incisor tooth. They may occupy the full width of the cingulum, its mesial or distal half or be confined to the marginal ridge when they are referred to as "marginal rests".

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切支托

切支托主要用作辅助支托或作为间接固位体，最常用于下颌尖牙。它安放在切角处圆滑的切迹中，最深的部分指向牙的中心。从美观角度来看，切支托是最不理想的支托形状，尤其是放在近中切角处时。如果支托的位置稍稍移动，使支托与近中或远中切角之间保留一些釉质，则会使外观得到改善。对切支托进行一些修改就成为楔状隙钩（或近远中夹）。这是一种伸展到唇面的近远中切支托的联合，从而使义齿能够对抗后退脱位力。

Incisal rests

An incisal rest is used predominantly as an auxiliary rest or for indirect retention and is most frequently used on mandibular canines. It occupies a prepared rounded notch at an incisal angle with its deepest part directed towards the centre of the tooth. Aesthetically, incisal rests are the least desirable form of rest, in particular where the mesio-incisal angle is involved. Appearance can be improved if the rest is sited a short distance away from the incisal angle thus retaining some enamel between the rest and the mesio or disto-incisal angle. A modification of the incisal rest is the embrasure hook (or mesiodistal grip). This is a combination of mesial and distal incisal rests that extend onto the labial surface thereby providing some resistance to backward displacement of the denture.

固位体

固位体是防止义齿脱离组织的部件。它用在桥基牙上防止义齿沿就位道的方向脱位时被称为“直接”固位体，用在远离可能的义齿旋转轴的牙齿上时被称为“间接”固位体。

Retainers

Retainers are components that prevent movement of the partial denture away from the tissues. They are described as "direct" when applied to abutment teeth to prevent withdrawal of the denture along its chosen path of insertion, or "indirect" when applied to teeth at a distance from a possible axis of rotation of a denture.

直接固位体

直接固位体可以进一步分为冠外

Direct retainers

Direct retainers may be further classified

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固位体和冠内固位体。冠外固位体的常见形式是卡环，冠内固位体通常采用精密附着体，当然也有冠外精密附着体的例子。下面的探讨仅限于冠外卡环装置，特别围绕以下三个问题：

- 一个有效的卡环装置的特点是什么？
- 影响卡环固位的因素有哪些？
- 需要多少个卡环？

有效的卡环装置

一个卡环必不可少的部分是设计在牙体倒凹区的弹性固位臂。卡环臂的弹性使它能够越过牙体外形高点进入倒凹区。

如果不是这样，患者就无法使义齿就位。如果使卡环臂变形后退越过牙体外形高点的力大于使义齿离开组织的力时，就位的义齿就有固位作用了。为了保证其效果，所有的卡环都必须遵循框 4-2 列出的设计准则。

修复学课本中充斥着各种关于卡环设计的描述和分类。把这些课本当作卡环设计的"秘诀"既令人失望又不合逻辑。在个体牙齿倒凹的分配上采

as extracoronal, of which the common example is the clasp, or intracoronal that usually take the form of precision attachments although there are examples of extracoronal precision attachments. Further discussion will be confined to extracoronal clasp assemblies and, in particular, will address three questions:

- What are the features of an effective clasp assembly?
- What factors can affect the retention of clasps?
- How many clasps are required?

Effective clasp assemblies

The essential element of a clasp is a flexible retentive clasp arm that is designed to lie against an undercut surface of a tooth. The flexibility simply allows the arm to pass over the maximum bulbosity of the tooth and into undercut.

Were this not so, the patient could not seat the denture. The seated denture will be retentive if the force required to flex the clasp arm back over the bulbosity of the tooth exceeds that acting to lift the denture away from the tissues. To ensure effectiveness all clasps must conform to the design criteria listed in Box 4-2.

Prosthodontic texts are replete with descriptions and classifications of the many possible designs of clasps. Use of such texts as a "recipe book" for clasp design is both

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框 4-2

有效卡环装置的设计准则

弹性卡环固位臂——*金属臂的末端富于弹性，位于牙体倒凹区表面。*

对抗臂——*位于与固位臂所在牙面的相反面上的刚硬部件。它对抗固位臂在移出倒凹区时对牙体产生的侧向力，并迫使固位臂变形。*

包绕——*卡环需要包绕牙体周长的一半以上，以防止压力状态下牙体脱离卡环的限制。*

支持——*防止卡环装置龈向移位的支托。*

被动性——*除了义齿的功能性活动或将义齿从口腔内取出的情况以外，固位臂不应对牙体产生压力。*

Box 4-2

Essential Design Criteria for Effective Clasp Assemblies

Flexible retentive clasp arm *— an arm of metal the end of which is flexible and lies against an undercut surface of a tooth*

Reciprocation *— rigid component(s) in contact with the opposite side of the tooth to the retentive clasp arm. This resists lateral forces applied to the tooth by the retentive clasp arm as it moves out of undercut and forces it to flex*

Encirclement *— involvement of more than half the circumference of the tooth to preclude movement of the tooth out of the confines of the clasp arms as stresses are applied*

Support *— a rest that prevents gingival displacement of the clasp assembly*

Passivity *— the retentive clasp arm should exert no pressure on the tooth until it is activated by movement of the denture in function or on its removal from the mouth*

用框4-2描述的设计准则，将会简单而符合逻辑地设计出有效的卡环。这些准则确实与那些秘诀相似，但它们的设计和应用简单多了（图 4-8）。

frustrating and illogical. By applying the design criteria described in Box 4-2 to the distribution of usable undercut on individual teeth it will be possible to design effective clasp simply and logically. These may indeed resemble those in the recipe

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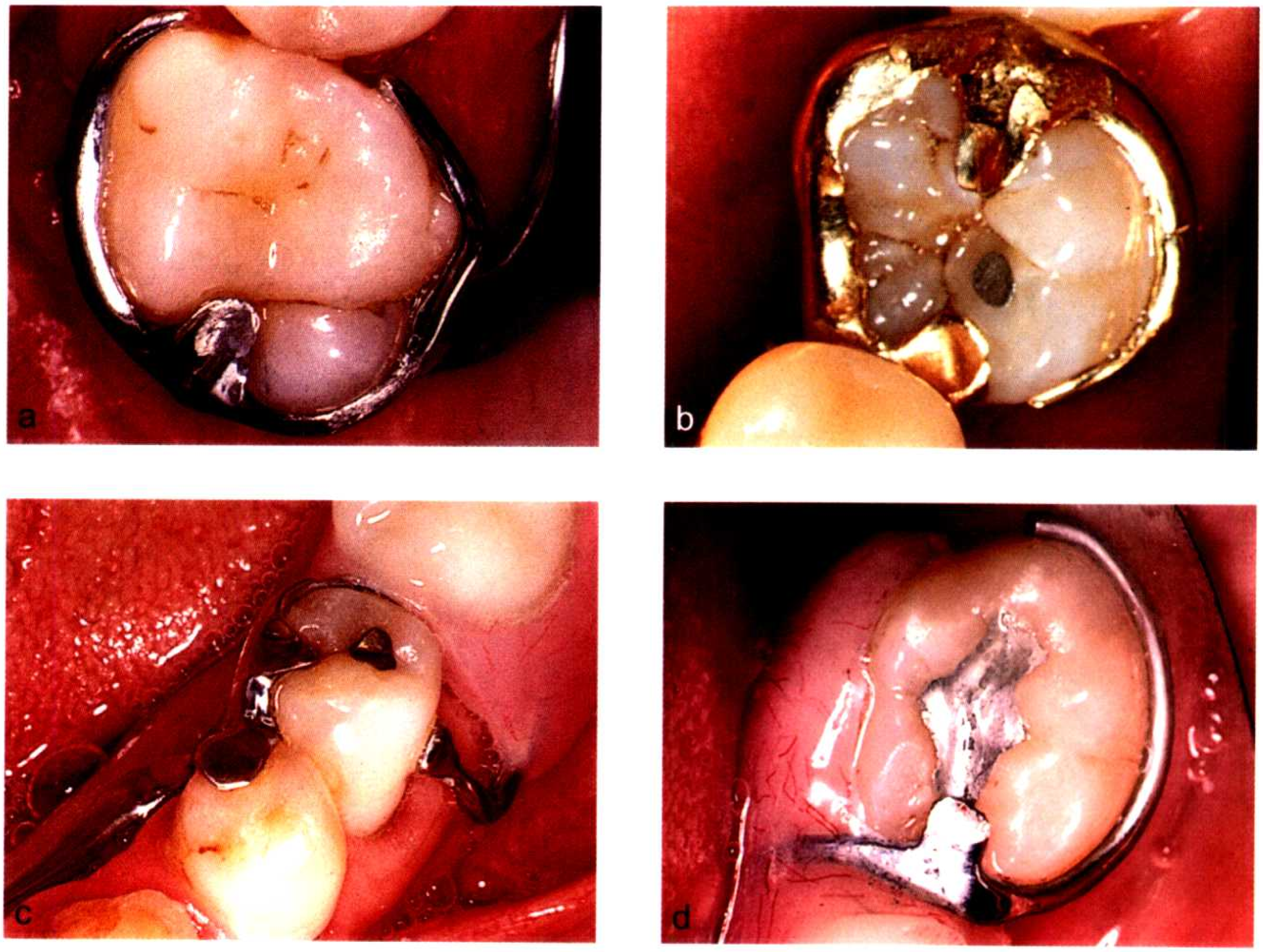


图 4-8 各种大相径庭的卡环设计样例，它们都遵循框 4-2 所列出的设计准则，并满足被动性原则

Fig 4-8 (a-d) Examples of widely differing designs of clasp all of which conform to the design criteria listed in *Box 4-2*. Passivity is assumed

虽然我们应强调，没有一种卡环设计被认为是比其他卡环设计更有效，但殆向式和龈向式仍是一种有用的、描述性的分类方法（图4-9）。最有效的卡环是离鞍基最近的卡环，并且其设计应该既有效又尽量简单。采用殆向式卡环和刚性臂，而不是板作为对抗，可以消除龈间隙。使用龈向式卡环臂时，应选择简单的I杆。它应该以直角跨过龈缘，继续下降2～3mm，再弯回

books but their design and application is much simpler (Fig 4-8).

A useful and descriptive classification is that of occlusally approaching and gingivally approaching clasp arms (Fig 4-9) although it should be emphasised that no clasp design has been shown to be more effective than any other. The most effective clasp will be the one nearest to the saddle and the design of clasps should be the simplest possible compatible with effectiveness. Clearance of the gingi-val

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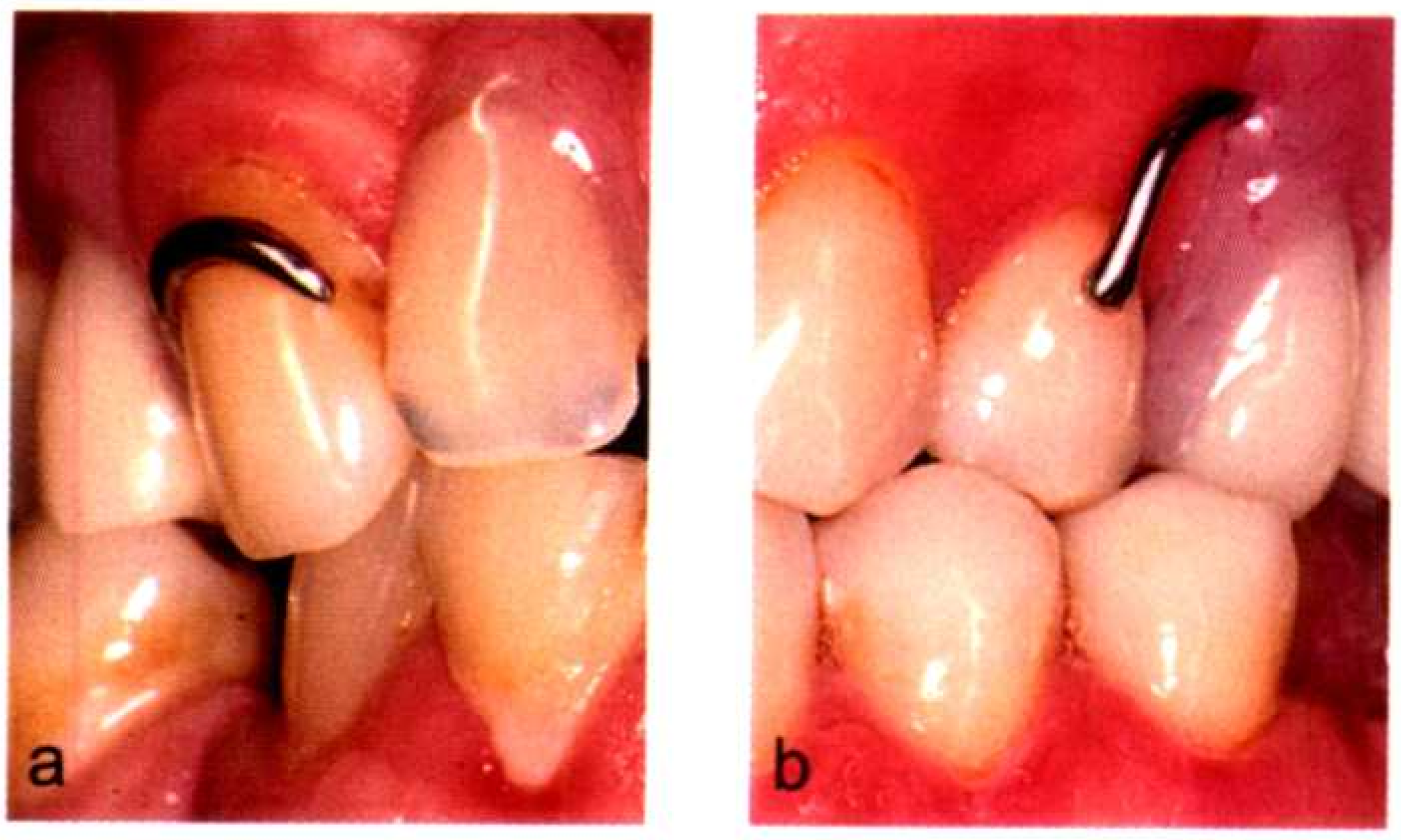


图4-9　卡环固位臂样例：a. 殆向式；b. 龈向式

Fig 4-9　Examples of (a) occlusally and (b) gingivally approaching retentive clasp arms

鞍基内。软组织倒凹深时忌用龈向卡环，此时固位臂无法进入倒凹区；如果尝试使用，将导致卡环与组织之间产生空隙，从而可能损害邻近的颊黏膜，并几乎毫无疑问会引起食物滞留。

margin is possible with occlusally approaching retentive clasp arms together with rigid arms rather than plates as reciprocal components. Where gingivally approaching clasp arms are to be used, a simple I-bar is preferred. This should cross the gingival margin at a right angle and continue down for a further 2–3mm before curving back into the saddle. The use of gingivally approaching clasps is contraindicated in the presence of deep soft tissue undercut. The retentive clasp arm cannot enter this undercut and their attempted use in these circumstances results in a space between the clasp arm and the tissues. This is likely to result in trauma to the adjacent buccal mucosa and will almost certainly act as a food trap.

影响卡环固位的因素

暂时忽略影响义齿固位的其他重要特征，卡环装置的固位力决定于以下因素：

Factors affecting clasp retention

Excluding for the moment other important features influencing the retention of a denture, the amount of retention developed by a given clasp assembly depends upon several factors:

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• 倒凹深度——这其实是不言而喻的。对于一个既有的卡环来说，它进入的倒凹越深，对抗脱位的固位力就越大。倒凹区的高度和宽度对固位力的影响较小。

• 固位臂的直径和所用合金的机械性能。固位臂的弹性，即是否容易跨过牙体的外形高点，明显影响固位力。固位臂的直径和所用合金的机械性能都对弹性有重要影响。重要的机械性能有弹性模量、比例极限和延展性。弹性模量反映了合金的刚性及其比例极限。超过该极限的进一步的弯曲会导致永久形变。从广义上说，延展性是衡量一个卡环永久形变后再被返回原来形状的难易程度。理想的卡环合金应该具有低弹性模量、高比例极限和高延展性。常用的合金都不能满足这些标准，最好的选择可能是金合金。

• 对于既定的合金，其弹性会随着固位卡环臂的直径和形状而改变。重要的变量有厚度、长度和

• Depth of undercut — This is really self-evident. For a given clasp, the greater the depth of undercut engaged the greater the resistance to withdrawal. The height and breadth of undercut area engaged will influence retention to a lesser extent.

• Mechanical properties of the alloy and dimensions of the retentive clasp arm The flexibility of the retentive clasp arm, i.e. how easily it can bend over the bulbosity of the tooth, will clearly affect retention. Both of the above factors have their principal effects on flexibility. The important mechanical properties are the modulus of elasticity, proportional limit and elongation. The modulus describes the stiffness of the alloy and its proportional limit the point beyond which further flexure results in permanent deformation. Elongation is a measure of how easily a clasp may be bent back after being permanently deformed. In broad terms the ideal alloy for clasps would have a low modulus of elasticity, a high proportional limit and high elongation. None of the commonly used alloys fulfils these criteria, the best probably being gold alloy.

• For a given alloy, flexibility will vary with the dimension and shape of the retentive clasp arm. The important

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曲度。厚度减少一半会使弹性增加到原来的8倍。卡环固位臂长度加倍也会使弹性增加到原来的8倍。卡环的曲度越大其刚性就越大。

- 卡环设计——通过改变卡环进入倒凹区的深度以及卡环的大小和形状来改变固位力是有可能的。事实上，卡环固位臂的长度和曲度受到牙体形状的限制，更重要的是，受卡环在牙体倒凹区的位置的影响。因此，弹性实际上只随卡环合金和厚度的改变而改变。利用厚度的改变来提高弹性最常见于钴铬合金卡环臂的设计。将这种硬质合金制成一端逐渐变细的形状，使得卡环固位臂的前半段弹性增加（图4-10）。一般的指导思想是，钴铬合金用作卡环臂时应该有足够的长度（15mm），最小的曲度，并且进入倒凹0.25mm。

- 安置卡环的牙齿的动度——如果义齿离开组织时对抗部分没有与牙体保持接触卡环固位臂

variables are thickness, length and curvature. A reduction in thickness by half will increase flexibility eight-fold. Doubling the length of the retentive clasp arm will again increase flexibility eight-fold. The tighter the curvature the more rigid the clasp.

- Clasp design — It is possible to vary the retention of a clasp by altering the depth of engaged undercut and its size and shape. In practice, the length and curvature of the retentive clasp arm is restricted by the shape of the tooth and, perhaps more significantly, by the position of the undercut on the tooth to be clasped. Variations in flexibility are, therefore, limited in practice to changing the alloy or clasp thickness. Use of this change in thickness to improve flexibility is clearly seen in the design of a cobalt-chromium retentive clasp arm. Here the use of a tapered pattern with this stiff alloy allows an improved flexibility of the terminal half of the retentive clasp arm (Fig 4-10). As a general guide, when cobalt-chromium alloys are used the clasps should be of adequate length (15 mm), minimum curvature and engage an undercut of 0.25 mm.

- The mobility of clasped teeth — If the reciprocating component does not remain in contact with the tooth as the

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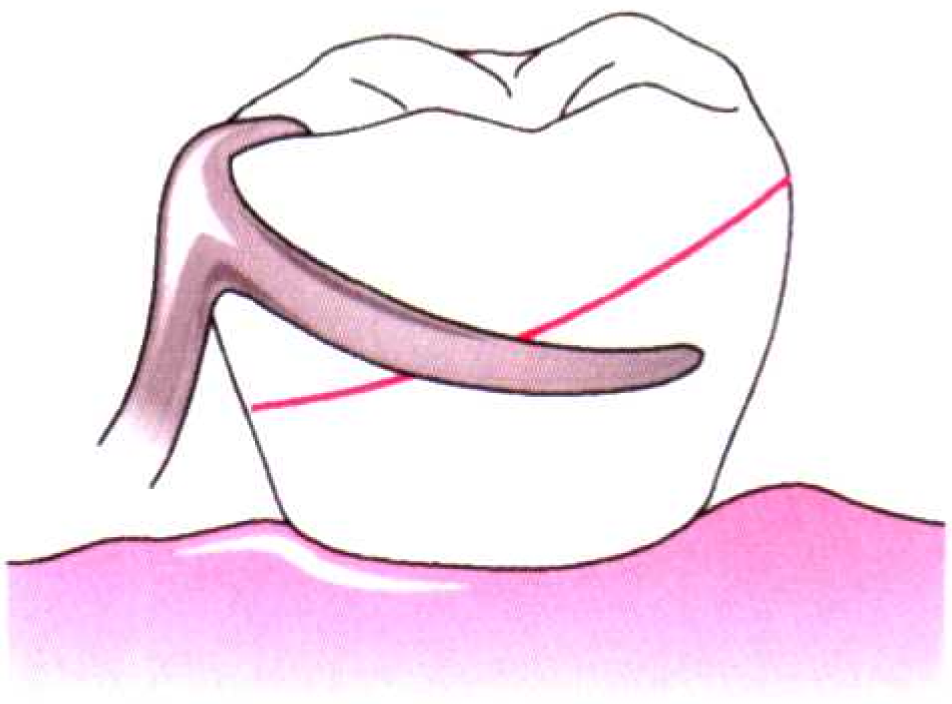


图4-10 钴铬合金卡环固位臂的前半段采用一端逐渐变细的形状，从而提高进入倒凹区时的弹性。卡环其他部分是刚硬的，置于观测线水平或观测线以上

Fig 4-10 Use of a tapered pattern for the terminal half of a cobalt-chromium retentive clasp arm to improve its flexibility as it passes into the undercut. All other parts of the clasp are rigid and placed on or above the survey line

就不会对牙体施加一个侧向力，这种情况经常出现。此时，卡环实际上已从倒凹区移出而不再起作用。使一个具有正常支持的牙齿移动约0.1mm仅仅需要100g的力，牙齿动度增加后这个数字将更小。当计划采用0.25mm的倒凹深度时，通常见于钴铬合金卡环臂，这种有限负荷下牙齿的移动应该引起重视。一个游离端鞍基约需要1.5kg的固位力，这个数据的确强调了一个事实，即这种情况下使用卡环固位是很有限的。

denture is displaced away from the tissues — this may often be the case — the retentive clasp arm is free to apply a force laterally to the tooth. The clasp essentially moves out of the undercut and will no longer be effective. The load required to move a normally supported tooth about 0.1 mm is said to be as low as 100g and this will reduce as tooth mobility increases. Such tooth movement under limited loading should be taken into account when planning with the 0.25 mm depth of undercut normally engaged by a cobalt-chromium clasp arm. A suggested force of some 1.5 kg required to retain a free-end saddle denture does emphasise the limitations of clasp retention in this situation.

必要的卡环数量

基于本人的临床经验建议只用两个直接固位体。卡环并不是惟一的固位方式，因为鞍基的坚硬部分进入邻

The number of clasps required

The recommendation that only two direct retainers are used is based on subjective clinical experience. Clasps are not the

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面、颊面、舌面也可以获得有效的固位。而且，随着时间的流逝，黏着力和附着力、抛光面的外形，以及肌肉的活动等因素都变得越来越重要，虽然它们的作用取决于鞍基的数目、大小和类型。

only means of retention because effective retention can be gained by engaging proximal, buccal and labial undercut with the rigid material of the saddle. Furthermore, factors such as adhesion and cohesion, polished surface shape and muscular activity assume greater importance with time, although their contribution will depend upon the number, size and type of saddles.

游离端鞍基义齿的支持和固位

差动支持

远中基牙的缺失削弱了游离端鞍基的支持，此时最好采用牙－黏膜混合支持式义齿。这种情况下，当咀嚼压力施加到鞍基上时，支托会将近中移动限制在桥基牙牙周膜生理范围内。但是，由于软组织较大的可移动性，鞍基后端将倾向于进一步下沉——“差动移位”，导致义齿以殆支托为中心转动。应该注意到，这种移位不常发生在上颌牙弓，因为大连接体常常被硬腭中线处特别坚硬的组织支持着。

Support and retention of free-end saddle dentures

Differential support

The absence of a distal abutment tooth reduces the support available to a free-end saddle denture and the best that can be achieved is a combination of tooth and mucosal support. In this case, when masticatory load is applied to the saddle the rest seat will limit movement mesially to a very slight depression of the abutment tooth within its periodontal ligament. However, because of the greater displaceability of the soft tissues, the posterior part of the saddle will tend to sink further - “differential displacement” that results in the denture rotating about the occlusal rest. It should be noted that such displacement does not usually occur in the upper arch since the major connector will usually be supported by the typically firm tissues of the midline of the hard palate.

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转　动

施加咀嚼压力时，游离端鞍基义齿可能以殆支托为中心转动，导致前牙区支架从牙齿上抬起。这种功能状态下的不稳定被认为会影响义齿的舒适性和功效，体内研究显示，由于负荷集中于桥基牙远中和义齿基托的远中端之下，导致负荷在桥基牙和义齿基托支持组织间分配不平衡。

Rotation

The likely rotation of the free-end saddle denture about the occlusal rest when masticatory loads are applied will result in the anterior part of the framework lifting away from the teeth. This instability in function is assumed to affect the comfort and efficiency of the denture and has been shown *in vivo* to result in an uneven distribution of load both to the abutment tooth and to the supporting tissues of the denture base with the load concentrated distal to the abutment tooth and beneath the distal end of the denture base.

卡环设计

游离端鞍基义齿卡环的设计应遵循本章前面提出的指导准则，但因为往往在需要较大固位力，尤其如 Kennedy Ⅰ 类义齿的时候，卡环却通常只能放置于前磨牙或尖牙上而使得实际固位力有限，因此游离端鞍基义齿的功效常常受到影响。关于游离端鞍基可摘局部义齿的卡环设计的理论很多，多数论述了在咀嚼压力下游离端鞍基下沉时卡环对桥基牙产生扭矩的可能性。提出的解决方法包括使用锻造金丝卡环固位臂增加弹性，以及龈向式卡环。

Clasp design

The design of clasps for free-end saddle dentures should follow the guidelines indicated earlier in this chapter but their effectiveness will often be a compromise between the large retentive forces required of, in particular, Kennedy class I partial dentures and the practical limits on clasp retention imposed by the abutment teeth which are commonly premolars or canines. There are many theoretical considerations of clasp design for free-end saddle partial dentures. Most address the possibility of the clasp applying torque to the abutment tooth as the free-end saddle is depressed under masticatory loading. Suggested solutions include increasing the flexibility of the retentive clasp arm by using wrought gold and

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the use of gingivally approaching clasps.

支托位置

在咀嚼压力下，殆支托的位置和卡环的设计会影响施加在桥基牙上的压力和扭矩。桥基牙更容易向支托所在的方向移动。义齿沿远中殆支托转动施加在桥基牙上的力，据说会导致压力集中在义齿基托远中端，从而增加无牙颌牙槽嵴的骨吸收，使桥基牙向远中移动并增加动度（图 4-11）。把殆支托移到近中面，则会使产生的力倾向于把桥基牙向近中移动。此外，通过把转动轴移到近中面，义齿移动的弧线会更垂直于支持软组织，会在下面的黏膜上产生一种更正常的负荷。RPI 卡环（近中殆支托、邻面板和龈向就位的 I 杆）就是专门针对这种支持游离端鞍基的桥基牙和组织上不利压力分配问题而设计的（图 4-12）。

Rest position

Rest position and clasp design are said to influence the stress or torque applied to the abutment tooth in response to masticatory loads. In particular, an abutment tooth will be moved towards the side on which the rest is located. Rotation of the denture about a distal rest exerts forces on the abutment tooth that are said to result in its distal movement and increased mobility and, by concentrating stress at the distal end of the denture base, increased bone loss at the edentulous ridge (Fig 4-11). By transferring the occlusal rest to the mesial surface the resultant forces will tend to move the abutment tooth mesially. Further, by moving the axis of rotation to the mesial surface the arc of movement of the denture base is more perpendicular to the supporting soft tissues resulting in a more normal loading of the underlying mucosa. The RPI clasp design (mesial rest; proximal plate and gingivally approaching I-bar) was introduced specifically to address these supposed problems of unfavourable patterns of stress distribution to the abutment tooth and the tissues supporting the free-end saddle (Fig 4-12).

虽然支持这样放置支托和设计卡环后产生这种效果的证据不足，但也的确表明：

- 不管卡环的设计如何，殆支托放

The evidence base supporting these effects of rest placement and clasp design is weak but does suggest that:

- mesial placement of the occlusal rest,

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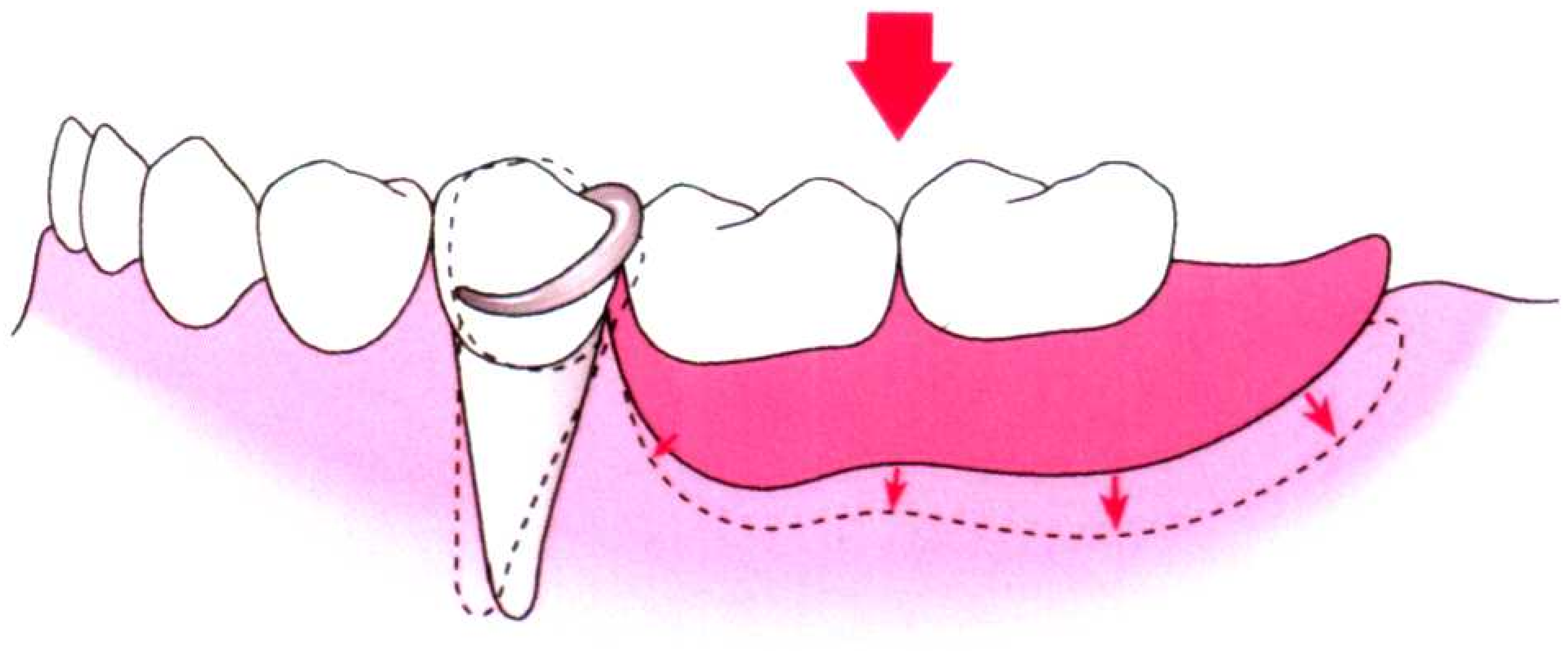


图 4-11 咀嚼压力下游离端鞍基差动脱位，远中支托导致压力集中在桥基牙和鞍基远中端，以远中𬌗支托为中心的转动引起卡环卡紧桥基牙并向远中脱位

Fig 4-11 Differential displacement of a free-end saddle under masticatory load. A distal rest leads to stress concentration distal to the abutment tooth and at the distal end of the saddle. Rotation about the distal rest causes the clasp to grip the abutment tooth and displace it distally

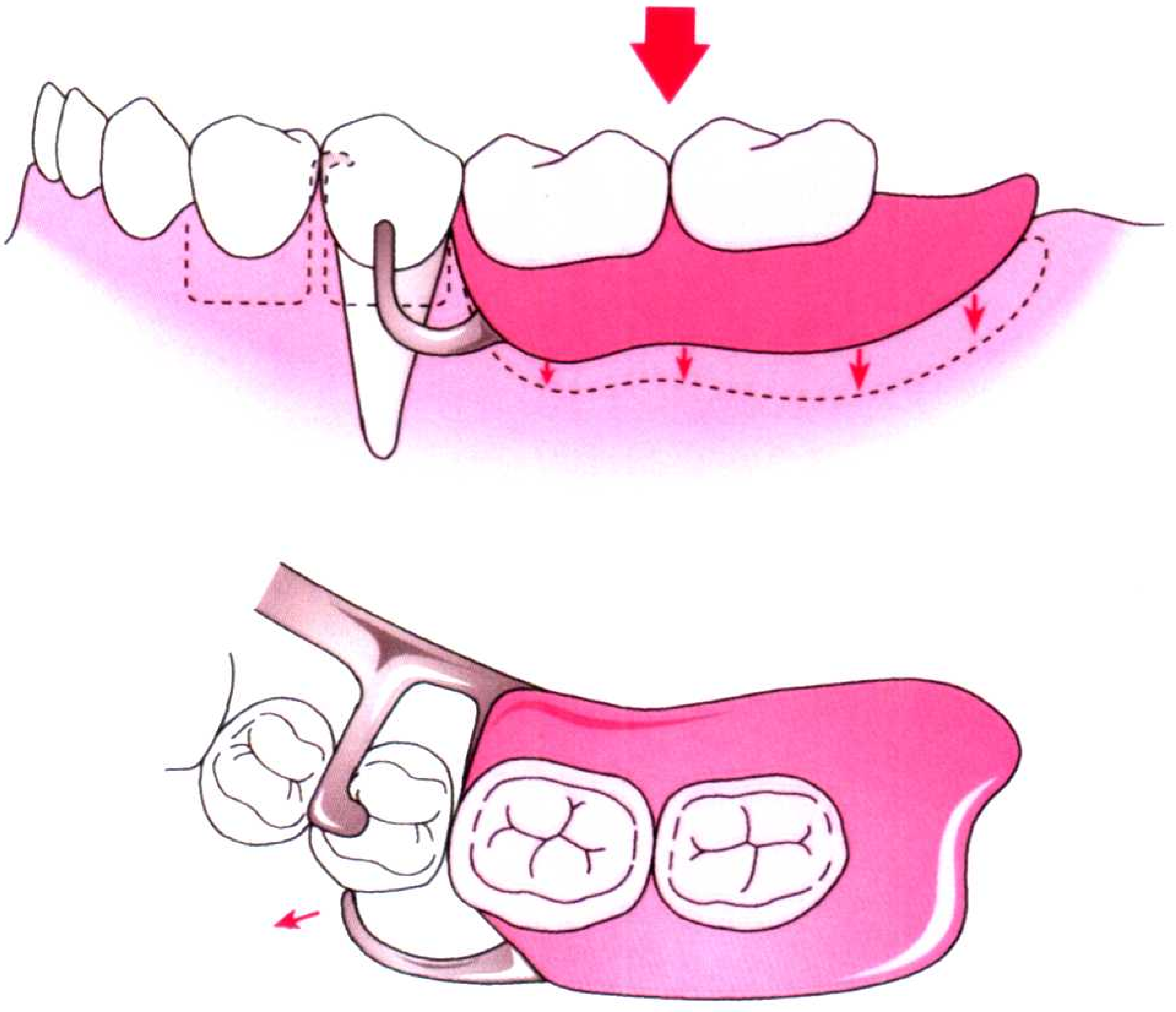


图 4-12 RPI（支托、板、I 杆）卡环设计保证以近中𬌗支托为中心的旋转。它会在咀嚼负荷时使卡环与牙体的接触消失，游离端鞍基下压力的分配更均匀，从而减小桥基牙上的应力

Fig 4-12 The RPI (rest, plate, I-bar) clasp is designed to ensure rotation about a mesial rest. This is said to reduce stress on the abutment tooth during masticatory loading as the clasp moves out of contact with the tooth and results in a more even distribution of stress beneath the free-end saddle

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在近中使得负荷减轻，并改善了基牙上的应力分布。

- 不管支托位置和卡环设计如何，咀嚼负荷都会导致义齿基托向前移位。

更实用有效的方法是首先减少差动移位的可能性。可以通过压力移位取模技术，记录负荷状态下的软组织形态，这样当承受负荷时，游离鞍基就位后推移软组织向下的潜在动度受限。这项技术的临床特点在第 11 章＂改良模型印模法＂中有阐述。

regardless of clasp design, results in reduced loading and improved stress distribution to the abutment tooth

- masticatory loads result in a forward movement of the denture base regardless of rest position or clasp design.

A more practical and effective approach is to reduce the potential for differential displacement in the first place. This is simply achieved using a displacement impression technique that records the soft tissues under load such that the processed free-end denture saddle will displace the tissues when seated and thus limit the potential movement of the denture base under occlusal load. Practical aspects of this technique are described under "Altered cast impression" in Chapter 11.

间接固位体

虽然有直接固位体，但义齿远离直接固位体的部分仍有旋转脱位的可能。这常见于游离端鞍基义齿。此时，脱位的形式是鞍基以桥基牙上卡环尖连线，即卡环轴，为支点旋转离开组织。采用间接固位体可以防止这种脱位（图 4-13）。

Indirect retainers

Despite the presence of direct retainers, rotational displacement of parts of the denture remote from the direct retainer is still possible. This is commonly seen with the free-end saddle denture. Here, the displacement occurs as a rotation of the saddles away from the tissues about a fulcrum drawn through the tips of the clasps on the abutment teeth, the clasp axis. It is prevented by providing indirect retention (Fig 4-13).

在卡环尖前方使用与牙齿接触的刚硬部件可以获得这种效果。当鞍基

This is achieved by incorporating rigid components that contact teeth forward of

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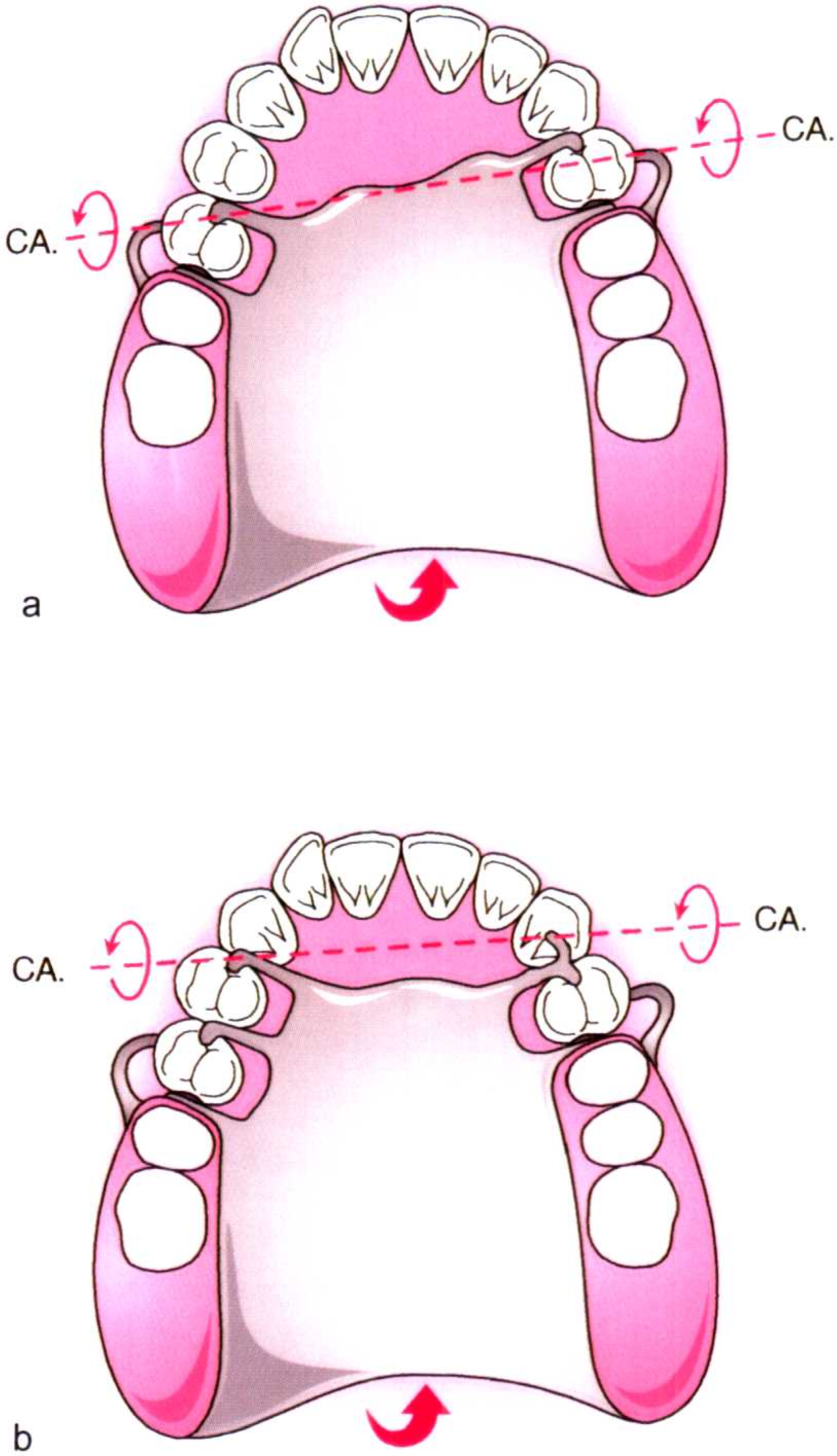


图 4-13　使用间接固位体。a. 鞍基以卡环轴（CA）为中心，无阻碍地旋转离开组织；b. 鞍基现在以4|和|3上的支托连线为轴旋转。界于新支点和鞍基之间、放在5|和|4上的直接固位体可以对抗鞍基的旋转脱位了

Fig 4-13 Providing indirect retention, (a) There is nothing to prevent rotation of the saddles away from the tissues about the clasp axis (CA). (b) The saddles now rotate about an axis between the rest seats placed on UR4 and UL3. The direct retainers at UR5 and UL4 placed between the new fulcrum and the saddles can now resist the rotatory displacement of the saddles

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刚要离开组织时，这种新的接触点将会充当支点。卡环处于新支点与游离鞍基之间，将会对抗鞍基的旋转脱位。这种刚硬部件安放得离卡环轴越远，它对抗鞍基旋转脱位的机械杠杆作用就越大。有点让人困惑的是影响这种旋转轴前置的部件被称为间接固位体。然而，应该明确的是，没有有效的直接固位体就不会有间接固位作用。支托是最简单的，可能也是最有效的一种间接固位体。其他的间接固位体包括舌板、带连续卡环的舌杆和改良连续卡环（牙杆）等大连接体。这些部件将在下一章中阐述。

the clasp tips. When the saddle now rotates away from the tissues, these new contacts will act as the fulcrum. The clasp is positioned between the new fulcrum and the free-end saddle and will resist its rotational displacement. The further these rigid components are placed away from the clasp axis the greater is the mechanical leverage acting against the rotational displacement of the saddle. Somewhat confusingly, the components effecting this forward positioning of this axis of rotation are termed indirect retainers. It should, however, be clear that there can be no indirect retention without effective direct retainers. Rests are the obvious and perhaps most effective examples of indirect retainers. Others include major connectors such as a lingual plate, lingual bar with continuous clasp and a modified continuous clasp (dental bar). These components are described in the following chapter.

间接固位体增加了牙龈覆盖并使义齿设计复杂化，但没有很好的证据来支持其临床效果。尽管如此，标准的修复学课本几乎无一例外地推荐游离端鞍基义齿使用间接固位体，这可能反映了当制作重衬印模时，间接固位体在便于稳定金属支架方面的作用。

There is no good evidence supporting the clinical effectiveness of indirect retainers which introduce additional gingival coverage and complicate the design of a partial denture. Despite this the use of indirect retainers with free-end saddle dentures is almost universally recommended by standard prosthodontic texts. This may reflect their role in facilitating the stabilisation of a metal framework when a reline impression is made.

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重 点

- 可摘局部义齿鞍基的重要特征包括殆面的设计，鞍基和桥基牙之间的关系，组织面的伸展范围以及制作所用的材料。
- 有效的支托是刚硬的，与已有的殆相协调，并允许可摘局部义齿在功能状态下作有限移动。
- 所有的卡环设计都应该遵循一定的基本准则。单个卡环提供的固位力在很大程度上取决于放置卡环的牙齿的牙体形态和牙周情况。
- 对于下颌游离端鞍基可摘局部义齿，解决确保足够支持和固位的实用方法是：在桥基牙上使用近中殆支托、常规设计的有效卡环，以及压力移位取模技术。
- 建议游离端鞍基义齿使用间接固位体，但不能以义齿设计过于复杂为代价。

Key Points

- Important features of partial denture saddles include the design of the occlusal surface, the relationship of the saddle to the abutment tooth, the extension of the fitting surface and the material used for its construction.
- Effective rests are rigid, conform to the existing occlusion and permit limited movement of the partial denture in function.
- All clasp designs should be based upon certain basic criteria. The retention offered by individual clasps is largely dictated by the morphology and periodontal status of the clasped tooth.
- A practical approach to the difficulty of ensuring adequate support and retention for lower free-end saddle partial dentures includes the use of a mesial rest on abutment teeth, effective clasps of conventional design and a displacement impression technique.
- Indirect retention is recommended for free-end saddle dentures but not at the expense of a overly complicated partial denture design.

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第5章 可摘局部义齿的设计：连接体

Partial Denture Design: Connectors

目 的

本章将在功能稳定和预防伤害的基本设计原则下，探讨可摘局部义齿连接体的设计和功能，还将帮助从业医师理解如何按照"卫生"原则把这些部件组合进可摘局部义齿的设计中。

Aim

This chapter will consider the design and function of partial denture connectors in the context of the basic design principles of stability in function and for the prevention of harm. It will also aim to help the practitioner understand how these components can be incorporated into partial denture designs that follow "hygienic" principles.

要 点

阅读本章后，从业医师应该能够认识到用于上下颌可摘局部义齿中的大连接体的重要设计特点，以及影响选择大连接体的临床因素。

Outcome

After reading this chapter the practitioner should be able to recognise the important design features of major connectors used for upper and lower partial dentures and the clinical factors that influence the selection of major connectors.

引 言

可摘局部义齿的鞍基和其他部件都被连接体连在一起。"大"连接体把鞍基和义齿连接起来，而"小"连接体则将支托和卡环等部件与鞍基和大连接体连在一起。

Introduction

The saddles and other components of the partial denture are joined by connectors. "Major" connectors link the saddles to the denture and "minor" connectors join components such as rests and clasps to the saddle and the major connector.

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大连接体

设计的一般原则

框 5-1 列出了大连接体的基本设计要求。大连接体应该是刚硬的，因为只有通过这种刚硬，可摘局部义齿的其他部件才可能起作用（惟一例外是有意采用弹性的、应力中断式设计）。刚性与连接体的长度、宽度（高度）和厚度有关。板倾向于薄而宽，杆则窄而厚。刚性意味着大连接体的各部分都不能进入倒凹区，所有与大连接体相关的倒凹都必须在制作大连接体前予以填平。

框 5-1

大连接体的基本特征

刚硬

如果可能，保持龈边缘的清洁

如果覆盖牙龈，则龈沟处应作轻微缓冲

不干扰软组织的移动

除鞍基以外，还从其他组件处获得支持

Major Connectors

General principles of design

The essential design requirements for major connectors are listed in Box 5-1. Major connectors should be rigid since it is only through this rigidity that all other components of the partial denture can be effective (the only exception to this rule is when flexible, stress-broken designs are deliberately used). Rigidity is a function of the length, width (height) and thickness of the connector, plates tending to be thin and wide, bars narrower but thicker. Rigidity dictates that no part of a major connector may enter an undercut and all unwanted undercuts in relation to the major connector must be blocked out prior to its construction.

Box 5-1

Essential Features of Major Connectors

Rigidity

Clearance of the gingival margin if possible

Minimal relief of the gingival sulcus if covered

Non-interference with movement of soft tissue

Support from components other than saddles

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大连接体对龈缘的覆盖应该降到最少，并且止于邻间隙。如果不接触牙龈，建议至少离开龈缘 3mm。当遇到如下情况时建议覆盖舌腭面：

- 没有充足的空间使刚硬连接体与龈缘之间保持足够的距离。
- 余留天然牙很少的牙弓要求额外的支持、环抱和间接固位作用。
- 预期会继续缺失牙齿，覆盖舌腭面会使在现存义齿上增加人工牙变得简单。
- 需要连接数个单独的鞍基。在这种情况下如果不接触龈缘而保持龈缘清洁，常会导致大连接体的外形复杂，患者感到不适，加剧食物滞留，并增加精确铸造的难度。

大连接体覆盖龈缘时应仅做轻微缓冲，过多的缓冲会导致龈组织向间隙增生。

连接体应该不妨碍软组织的正常运动，并且在功能运动时也不应该冲

Coverage of the gingival margin should be kept to a minimum. The major connector should finish interproximally and where it is designed to be free of the gingival margin a clearance of at least 3 mm is recommended. Coverage of palatal and lingual surfaces is suggested when:

- There is insufficient space for a rigid connector with adequate clearance of the gingival margin.
- Additional support, bracing and indirect retention is required in an arch in which few natural teeth remain.
- The future loss of teeth is anticipated; coverage of palatal or lingual surfaces will simplify the addition of replacement teeth to the existing denture.
- There are several single tooth saddles to be connected. The attempt to clear the gingival margin in this circumstance often results in a complicated outline of the major connector that is uncomfortable for the patient, likely to encourage food trapping and can be difficult to cast accurately.

Minimal relief of the gingival sulcus should be provided when the connector covers the gingival margin. Inclusion of more substantial relief simply results in proliferation of the gingival tissues into the space.

Connectors should not prevent normal soft tissue movements or impinge on soft

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击软组织。对于预期在功能状态下有下沉和旋转时通常应予以组织缓冲。这种缓冲对于不能手术消除的隆突、其他外生骨隆突，以及凸出的腭中缝区是必不可少的。缓冲的量取决于支持组织的质量和其他部件对抗旋转的能力。例如，游离端鞍基义齿的移动量可能大于良好支持和固位的有界限鞍基义齿。

tissue when they move in function. Additional tissue relief is therefore normally indicated in anticipation of settling and rotation during function. Such relief is essential over inoperable tori, other exostoses, and prominent median palatal suture areas. The amount of relief is dependent upon the quality of support and resistance to rotation afforded by other components. It is, for example, likely that a free-end saddle denture will move more than a well retained and supported bounded saddle dentures.

除鞍基以外，所有大连接体都应该从组件处获得支持。这种支持主要来源于支托，支托止于专为容纳它们而制备的支托凹中。

All major connectors should be supported by components other than the saddles. This support is primarily derived from rests terminating in seats specifically prepared to receive them.

上颌大连接体

腭部组织宽大，这意味着其可用空间不限制应用需要避开龈缘的刚硬上颌大连接体。影响和限制上颌大连接体设计的更重要因素包括缺牙间隙的数目、分布和可获得的义齿支持的质量，腭部的解剖特征以及患者的接受程度。后者可以通过将连接体的外形线限制在硬腭的中部和(或)后部来实现。大连接体延伸到神经支配丰富的腭前部组织会使患者无法忍受，不舒服。相反，患者的呕吐反射通常也会限制上颌大连接体过度向后延伸。下面阐述几种常见的上颌大连接体。

Maxillary major connectors

The broad extent of the palatal tissues available for the placement of the maxillary major connector means that availability of space is not normally a constraint on the use of rigid maxillary major connectors that avoid gingival coverage. More important factors that influence and constrain the design of maxillary major connectors include the number and distribution of edentulous spaces, the quality of the available denture support, palatal anatomical features and patient acceptance. The latter is better achieved by restricting the connector outline to the middle and/or pos-

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terior parts of the hard palate. Involvement of the more richly innervated anterior palatal tissues can be associated with greater patient intolerance and discomfort. In contrast, a gag reflex in a patient will prevent normal posterior extension of the upper connector. Some common examples of upper major connectors are described below.

腭　板

呈宽大的带状或者板状，有效地把两侧的鞍基连为一体（图 5-1）。其刚硬不是问题，而且很容易通过止于邻间隙而产生龈缘间隙。连接体的外形反映出义齿鞍基的长度和位置。虽然连接体在跨过腭中线时的外形会受到需要额外支持和患者忍耐力的影响，但按照一般规则，跨过腭部的连接体的宽度应该接近鞍基的最大宽度，其后界位置则体现大多数鞍基的最后边缘。连接体的前界边缘通常应贴合腭皱襞并随之而弯曲，但对于广泛扩展的双侧游离端鞍基，则可能需要决定将连接体扩展到余留前牙的腭侧，这样会提供更好的支持、环抱和有效的间接固位作用，但也会造成牙龈的覆盖。一种更“卫生”的选择是牙杆。由于重量原因，覆盖大部分硬腭组织的铸造金属连接体可能会导致固位问题。这种情况下可以选择义齿前部使用铸造金属支架，义齿后部使用树脂，两者通过连接体上的固位圈结合起来。

Palatal plates

These take the form of broad straps or plates that serve effectively to unite bilateral saddles (Fig 5-1). Rigidity is not a problem and clearance of the gingival margin is readily achieved by ending the connector interproximally. The connector outline simply reflects the length and position of the denture saddles. As a general rule, the width of the connector across the palate should approximate that of the longest saddle. The position of the posterior border of the connector reflects the position of the most posterior saddle although its outline across the palatal midline will be influenced by the need for additional support and patient tolerance. The outline of the anterior border should normally follow and blend with the irregularities of the palatal rugae but, in the special circumstance of extensive bilateral free-end saddles, a decision may be made to extend the connector on to the palatal surfaces of the remain-

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图 5-1 上颌板型连接体。a. 跨过腭部的腭板中部的宽度反映了鞍基的最大宽度；b. 连接体后部的延伸及其在少数余留前牙腭面的伸展反映了提高义齿支持和固位的需要，金属前部和树脂后部的结合减轻了连接体的重量

Fig 5-1 Maxillary plate type connectors, (a) The width of the mid-palatal strap across the palate reflects the length of the longest saddle, (b) The posterior extent of the connector and its extension on to the palatal surfaces of the few remaining anterior teeth reflects the need to improve support and bracing. The combination of metal anteriorly and acrylic posteriorly reduces the weight of the connector

ing anterior teeth. This can give better support and bracing and will introduce effective indirect retention. However, it is associated with gingival coverage. A more "hygienic" alternative would be a dental bar. A cast metal palatal connector that covers most of the hard palatal can lead to problems of denture retention simply through the weight of the connector. An alternative in this circumstance is to combine cast metal anterior elements with acrylic through the use of retentive loops incorporated into the metal part of the connector.

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前后杆（环形连接体）

同时使用前部杆和后部杆可以不借助更大面积的腭覆盖就提供足够的硬度（图5-2）。当牙支持充足，并且长的有界限鞍基或游离端鞍基义齿的软组织支持很理想的时候，就可能采用这种设计。明显的腭中线隆突限制了中腭板的使用时也可以用这种设计，环形连接体的后部可以置于腭隆突之后。这种设计对腭组织的覆盖面积减少，患者很喜欢，它改善了患者对食物质地的感受。当试图用增大腭部覆盖面积的设计来代替支持力不足的环形连接体时，可能会引起患者的接受困难。

Anterior and posterior bars (ring connector)

The combination of anterior and posterior bars allows sufficient rigidity without recourse to more extensive palatal coverage (Fig 5-2). The use of this design is possible when tooth support is adequate and the quality of the soft tissue support for long bounded or free-end saddles is excellent. It can also be used when a prominent midline palatal torus prevents the use of a midpalatal plate and the posterior element of the ring connector can be placed posterior to the palatal torus. The reduced coverage of the palatal tissues associated with this design is often preferred by patients as it improves appreciation of the texture of food. This may lead to difficulties in patients' acceptance when attempting to replace an inadequately supported ring connector with a design involving more extensive palatal coverage.



图 5-2　环形连接体

Fig 5-2　A ring connector

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马蹄状连接体

这种连接体的名字显然反映了它的外形（图5-3）。它可能是上颌大连接体中最不宜采用的一种设计，因为它通常很难保证既有足够的刚性，又有龈缘的清洁。这种连接体适用于腭隆突较大，限制了腭中、后区连接体的放置或者患者不能耐受上颌连接体向后延伸的时候。

Horse-shoe connector

The name of this connector simply reflects its outline (Fig 5-3). It is perhapsthe least desirable design of upper major connector as it is often difficult to combine adequate rigidity with clearance of the gingival margin. This connector is indicated when a large palatal torus prevents placement of the connector in the mid and posterior palatal regions or when patients cannot tolerate the posterior extension of the upper connector.

下颌大连接体

既然硬度和龈缘清洁是设计的基本原则，那么影响选择下颌大连接体的主要因素就是舌侧龈缘和前牙口底功能性深度之间可利用的间隙。此外，由于舌侧前部软组织的解剖形态，虽然某些设计通过与下前牙舌面的接触会起间接固位作用，但下颌大连接体不能提供额外的黏膜支持。几种不同的下颌大连接体已经被介绍过，它们基

Mandibular major connectors

Given the principal design objective of rigidity and gingival clearance, the main factor influencing the choice of lower major connector is the space available between the lingual gingival margin and the functional depth of the floor of the mouth anteriorly. In addition, as a consequence of the anatomical form of the anterior lingual soft tissues, lower major connectors can



图5-3 马蹄状连接体，遗憾的是这种连接体通常需要覆盖牙龈

Fig5-3 A horseshoe connector. Unfortunately, this connector is often associated with gingival coverage

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本上反映了运用"卫生"设计原则和可提供的空间的关系。这些连接体类型及其使用的临床指征的总结见表5-1。

offer no additional mucosal support although some designs will contribute to indirect retention through their contact with the lingual surfaces of lower anterior teeth. Several distinct designs of lower major connector are described and these essentially reflect the desire to use the principle of "hygienic" designs and the space available. These connector types and the clinical indications for their use are summarised in Table 5-1.

舌　杆

舌杆通常是试图缓冲龈缘的下颌大连接体的首选。舌杆的横截面应该近似泪滴状，厚度最大的地方在下缘，

Lingual bar

The lingual bar is commonly described as the first choice for lower connectors that attempt to clear the gingival margin. In

表 5-1　影响选择下颌大连接体的临床因素

Table 5-1　Clinical factors influencing the selection of lower major connectors

临床因素	下颌大连接体				
	舌杆	舌下杆	舌板	牙杆	颊杆
空间充足 *	✓	✓	×	×	×
空间不足	×	×	✓	✓	✓
舌系带过短	?	×	✓	✓	×
牙龈退缩	×	✓	×	✓	×
牙间隙	✓	✓	?	?	×
临床牙冠短	✓	✓	✓	×	×
余留牙预后差	×	×	✓	×	×
舌干扰	×	×	×	×	✓
需要间接固位体	×	×	✓	✓	×

注：* 空间充足意味着舌侧龈缘与前牙口底功能性深度之间有 6～7mm 的空间

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然后在与舌侧软组织接触、垂直向上延伸的过程中逐渐减小（图5-4）。为了保证硬度，舌杆应该有3～4mm的高度。随着杆的长度的增加，这个数字还将增大。为了保证足够的清洁，杆的上缘应该置于龈缘下3mm处，下缘应该在功能性运动允许的情况下，尽可能进入前部舌沟深处。这其实意味着在略升高的舌沟与龈缘之间要有6～7mm的空间。牙龈退缩和过高的舌系带会减少有效空间，这通常是使用舌杆的禁忌证。

cross-section, the lingual bar should resemble a tear-drop with the greatest thickness at its lower margin that then reduces vertically as it approaches the upper margin in contact with the lingual soft tissues (Fig 5-4). To ensure rigidity the lingual bar should be approximately 3—4 mm high although this requirement will increase with the length of the bar. To ensure adequate clearance, the upper border should be placed 3 mm below the gingival margin and the lower border should be placed as far into the anterior lingual sulcus as functional movement of these tissues will allow. This effectively means a space requirement of about 6—7mm between the slightly elevated lingual sulcus and the gingival margin. Gingival recession and a prominent lingual fraenum can reduce the available space and are common contraindications to the use of a lingual bar.

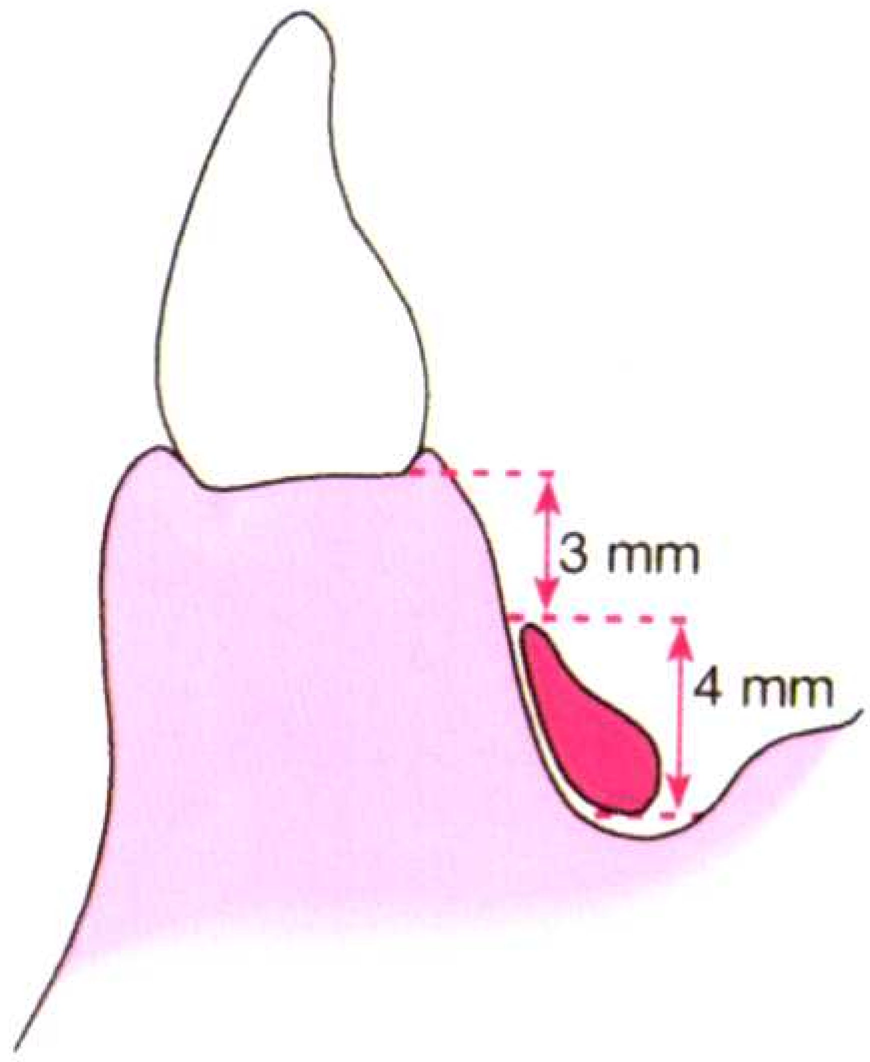
舌下杆

舌下杆最初是为了解决舌杆相对容易弯曲的问题而提出的，它的设计占满了前牙区舌沟的功能性深度和宽度（图5-5）。其结果是，与舌杆相比，厚度和刚性明显增加。此外，舌下杆的高度较舌杆低，这使得杆的上缘离龈缘较远。虽然过高的舌系带限制了舌下杆的应用，但在牙龈退缩的病例中，舌下杆可以保持龈缘足够的清洁。舌下杆可能引起食物嵌塞，尤其是当杆

Sublingual bar

The sublingual bar was originally developed to address the problem of the relative flexibility of the lingual bar. It is designed to occupy the full functional depth and width of the anterior lingual sulcus (Fig 5-5). The result is a significant increase in thickness and therefore rigidity as compared to the lingual bar. In addition, the height of the sublingual bar is less than the lingual bar and this places the upper bor-

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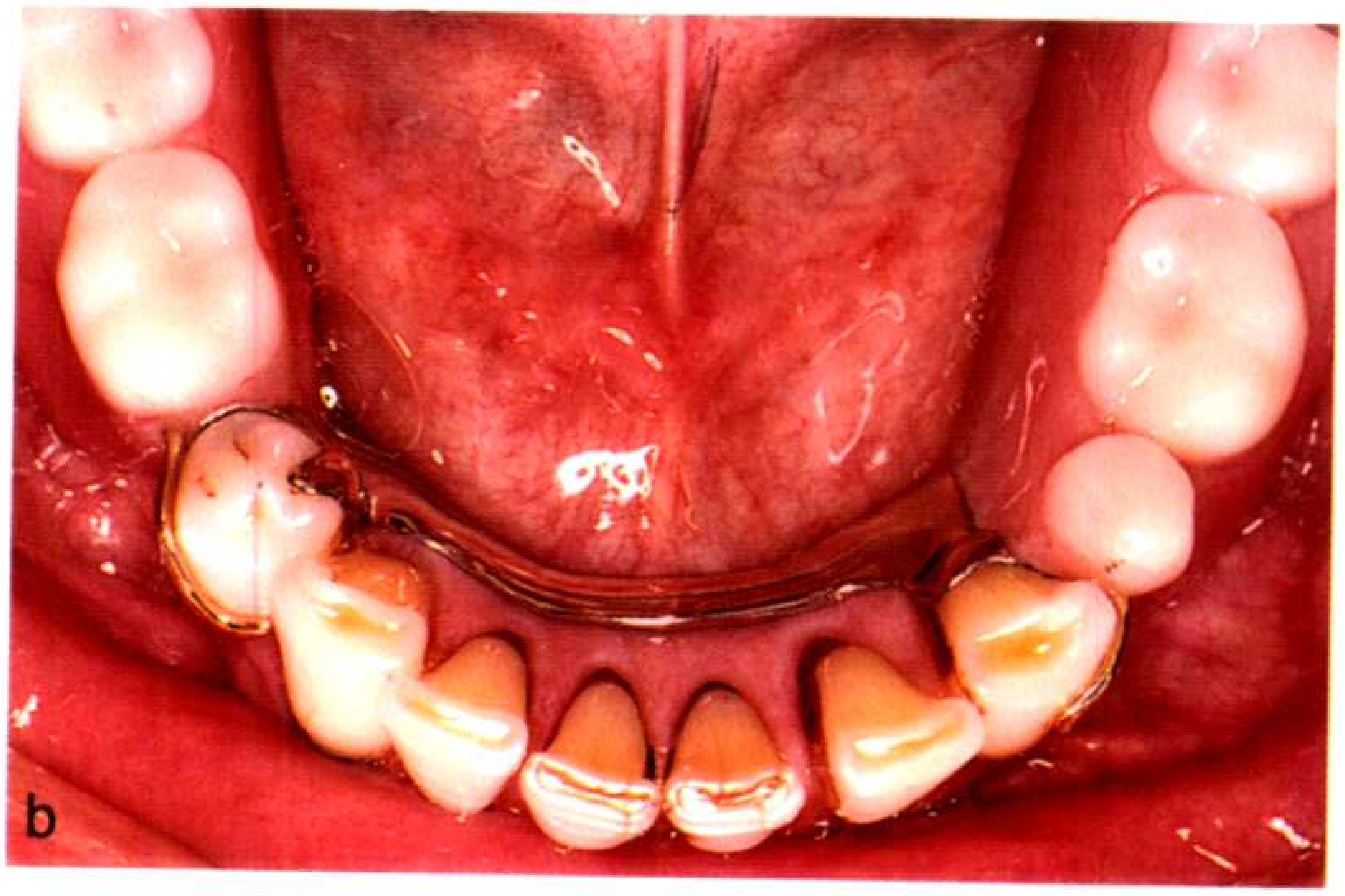


图5-4　舌杆：a. 舌杆的大小及其需要的空间；b. 临床外观

Fig 5-4　The lingual bar. (a) Dimensions and space requirements for a lingual bar. (b) Clinical appearance



图5-5　舌下杆占据了前牙区功能性舌沟，导致其厚度增加

Fig 5-5　The sublingual bar occupying the functional anterior lingual sulcus with resulting increase in thickness

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的上缘与软组织紧密接触的时候，这可以通过在舌下杆与下面的黏膜之间稍稍缓冲以减少食物嵌塞。

der of the bar further away from the gingival margin. This allows the use of the sublingual bar with adequate gingival clearance in the presence of gingival recession although a prominent lingual fraenum will still prevent its use. Food trapping can be associated with the use of the sublingual bar, in particular when there is tight contact of the superior border of the bar with the soft tissues. This can be reduced by introducing slight clearance between the sublingual bar and the underlying mucosa.

制作舌下杆需要一个精确的、有控制的前牙区功能性舌沟印模。虽然这会使可摘局部义齿的印模过程复杂化，但最后的模型却能给技工室的技师一个关于大连接体设计的明确指示。反之，舌杆的制作依赖使用预成蜡型和技师的自由判断则较不可取。舌下杆相对较厚暗示着患者对这种连接体的接受可能成为问题。然而，对舌下杆优点的认识，以及口腔中这个区域感觉的相对迟钝通常会使患者很容易接纳舌下杆。

Fabrication of the sublingual bar requires a controlled and accurate impression of the functional anterior lingual sulcus. Although this can complicate the impression procedures for a partial denture, the resultant cast provides the laboratory with a very clear prescription for the design of the major connector to the technician. In contrast and perhaps less desirably, construction of a lingual bar relies on the use of preformed wax patterns and the technician's discretion. The relative bulk of the sublingual bar suggests that patient tolerance of this connector may be problematic. However, a combination of the patient's awareness of its advantages and the relative lack of sensory perception in this region of the mouth normally results in good patient acceptance.

牙　杆

当空间不足或过短的舌系带限制

Dental bar

The dental bar is a "hygienic" alterna-

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了舌杆或舌下杆的使用时，牙杆是个"卫生"的选择（图5-6）。它特别适用于牙周治疗后牙龈退缩的患者，其龈缘的清洁有利于将来的菌斑控制。牙杆的外形需要贴合舌侧牙冠的轮廓，并在邻间隙处增厚以保证硬度，尽管这样可能导致患者难以接受。余留下颌前牙之间的空隙要用粘结复合材料彻底关闭，否则会妨碍牙杆的使用。

tive when the lack of space or a prominent lingual fraenum prevents the use of a lingual or sublingual bar (Fig 5-6). It is indicated, in particular, in patients with gingival recession following periodontal treatment where clearance of the gingival margin will facilitate future plaque control. The outline of the dental bar follows that of the lingual coronal contour with thickening interproximally to ensure rigidity although this can result in reduced patient tolerance. Spacing between the remaining lower anterior teeth prevents the use of a dental bar unless the spacing is closed simply with adhesive composite restorations.

舌　板

当空间或者解剖因素限制舌杆或舌下杆使用时，舌板是一种常用的选择（图5-7）。舌板的外形由舌杆延着余留牙舌面呈"围裙"状向上延伸而成，下界位于功能性舌沟的黏膜转折处，而上界止于下前牙舌隆突处。舌板的主要缺点是覆盖了牙龈，它不宜用于

Lingual plate

The lingual plate is a frequently used alternative when space and anatomic limitations prevent the use of a lingual or sublingual bar (Fig 5-7). The outline of the lingual plate consists of a lingual bar which continues superiorly as an upper "apron" shaped to follow the lingual contours of the



图 5-6　牙杆（感谢 B.Öwall 教授）

Fig 5-6　A dental bar. (Courtesy of Prof. B. Öwall.)

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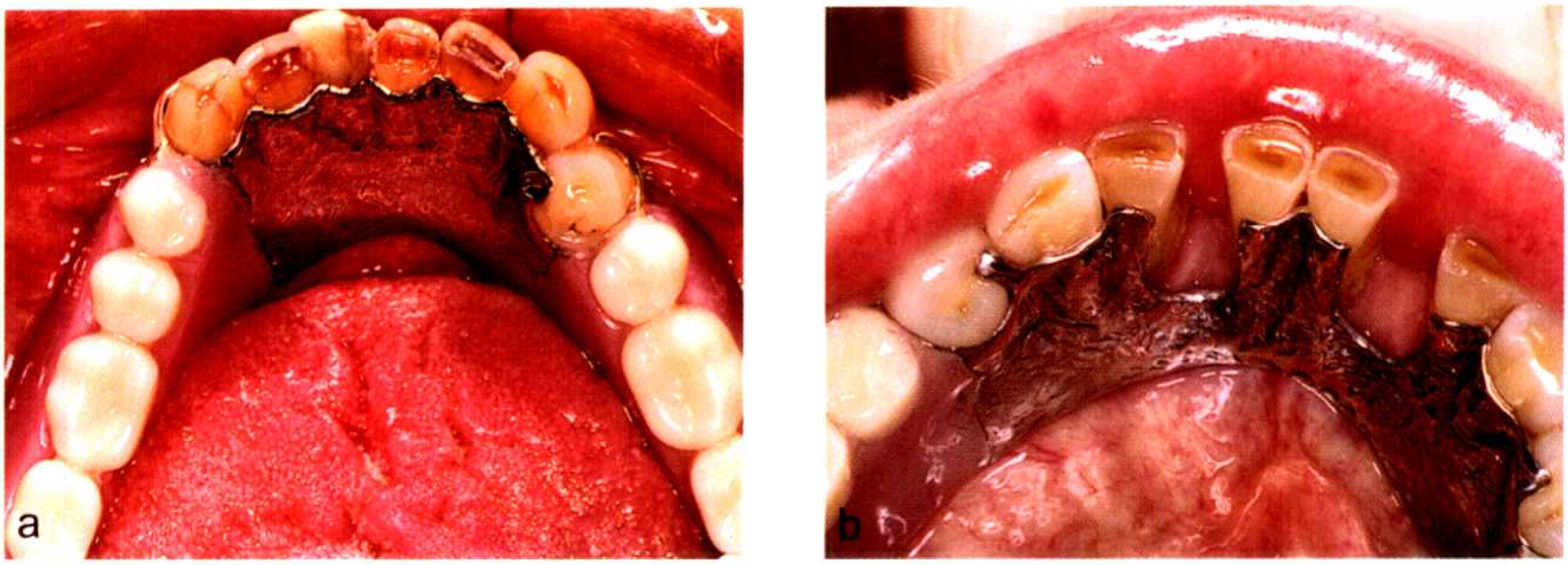


图 5-7 a. 常规舌板的外观；b. 修饰前牙间隙的舌板

Fig 5-7 (a) Appearance of a conventional lingual plate, (b) Lingual plate cut away to accommodate spacing between anterior teeth

在成功牙周治疗以后，未来需要较高水平的菌斑控制使余留牙保持牙周健康的患者。牙周治疗后牙间隙往往增大，如果采用舌板的话，会不可避免的造成令人难以接受的金属暴露。舌板通常用于下颌超短牙弓，可以增加支持、环抱，并提供有效的间接固位作用。舌板尤其适用于对余留牙预后不确定的病例，因为将来在现有舌板上增加人工牙相对容易。余留前牙之间的微小间隙可以通过在舌板上裙做 V 形切迹来修饰（图 5-7b）。

remaining anterior teeth. The lower border is positioned at the reflection of the functional lingual sulcus with the upper border ending at or on the cingulae of the lower anterior teeth. The major disadvantage of the lingual plate is the involved gingival coverage and its use is not recommended where the future maintenance of high levels of plaque control is essential to ensure the continuing periodontal health of the remaining teeth as will often be the case after successful periodontal therapy. The increased interproximal spacing often consequent to periodontal therapy will in any event result in an unacceptable show of metal should a lingual plate be used. The lingual plate is commonly used for severely shortened lower dental arches where it is said to augment available support and bracing and provide effective indirect retention. In particular, the lingual plate is indicated

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when some remaining teeth are of doubtful prognosis as the future addition of teeth to the lingual plate of an existing denture is a relatively straightforward procedure. Slight spacing between remaining anterior teeth can be accommodated by notching the upper apron of the lingual plate (see Fig 5-7b).

颊　杆

牙体舌倾或无法手术去除的下颌骨隆突的患者，妨碍使用舌侧大连接体或其他修复缺牙选择，此时，颊杆是修复严重舌侧干扰病例的最后一种方法（图5-8）。由于颊侧的软组织倒凹，以及与舌杆相比因长度增加产生的易弯曲性，导致颊杆的制作较困难。

Buccal bar

The buccal bar is the last resort when severe lingual interferences – for example, lingually tilted teeth or inoperable mandibular tori, prevent the use of a lingual major connector or other restorative options for the replacement of the missing teeth (Fig 5-8). The presence of labial soft tissue undercut and the relative flexibility of the buccal bar resulting from its increased length compared with a lingual bar frequently cause difficulties in construction.



图 5-8　在后牙严重舌倾妨碍了其他任何连接体的使用时选用颊杆

Fig 5-8　Use of a buccal bar where interferences presented by the severely lingually tilted posterior teeth prevent the use of any other connector

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Kennedy杆（连续卡环）

Kennedy杆是舌杆和连续卡环的结合，用于因空间限制、妨碍应用刚硬的常规舌杆结构时。厚度减小的舌杆与连续卡环的联合使用，保证了这种连接体的足够硬度。但由于空间的限制，迫使我们采用较小的舌杆，导致杆放置得离龈缘过近。此外，连续卡环相对较厚，置于牙体舌面呈扇形杆形式，常常使患者难以忍受。除此之外，还有一些更有效的、具有历史意义的选择。

Kennedy bar (continuous clasp)

The Kennedy bar essentially combines a lingual bar and a continuous clasp and was used when space limitations prevented the construction of a rigid conventional lingual bar. The combination of a lingual bar of reduced thickness together with the continuous clasp ensured adequate rigidity of the connector. The difficulty is that the limitation of available space enforces the use of a smaller lingual bar resulting in the bar being place too close to the gingival margin. In addition, the continuous clasp that takes the form of a relatively thick, scalloped bar on the lingual surfaces of the teeth is frequently poorly tolerated by patients. There are more effective options to this connector, whose use should be considered as historic.

小连接体

刚性设计原则同样适用于小连接体。当连接支托、卡环到大连接体上时，在邻间隙安放小连接体可以减少对牙龈的覆盖（图5-9）。此时，小连接体应该呈三角形以适合楔状隙，占据最少空间并保证硬度。小连接体呈直角跨过龈缘，与大连接体衔接处应该圆滑无角度，以防止铸造支架内部出现应力集中。

Minor Connectors

The design principle of rigidity applies equally to minor connectors. When joining rests and clasps to major connectors, minimal gingival coverage is achieved by placing the minor connector interproximally (Fig 5-9). Here, it should be triangular in form so as to fit the embrasure and occupy minimal space compatible with rigidity. The gingival margin should be crossed at a right angle and the junction with the major connector should be rounded rather than angular to prevent stress concentration within the framework casting.

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图 5-9　小连接体连接 4| 上的殆支托到大连接体

Fig 5-9　A minor connector linking the occlusal rest at UR4 to the major connector

重　点

- 可摘局部义齿的连接体应该是刚硬的，可能的情况下应该避免覆盖牙龈。
- 上颌大连接体可能是腭板、前后杆或者马蹄状连接体。
- 刚硬且避免覆盖牙龈的上颌大连接体容易实现，但影响大连接体设计的更重要的因素是可摘局部义齿鞍基的数目、大小和分布，解剖学因素，以及患者的耐受性等。
- 重要的下颌大连接体设计有舌杆、颊杆、舌下杆、牙杆以及舌板。
- 可利用的空间大小是影响选择刚硬且避免覆盖牙龈的下颌大连接体的主要因素。其他的因素

Key Points

- Partial denture connectors should be rigid and avoid gingival coverage where this is possible.
- Upper major connectors may be palatal plates, anterior and posterior bars, or of the horse-shoe type.
- Upper connectors that are both rigid and avoid gingival coverage are normally easily achievable and factors such as the number, size and distribution of partial denture saddles, anatomical considerations and patients' tolerance are more important influences on upper major connector design.
- The important lower major connector designs are the lingual, buccal, sub-lingual and dental bars, and lingual plate.
- The availability of space is the major factor influencing the choice of lower major connectors that are both rigid

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包括余留牙的预后、形态以及相关软组织的解剖结构。

and attempt to avoid gingival coverage. Additional factors pertain to the prognosis of the remaining teeth, their morphology and the anatomy of the associated soft tissues.

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第6章 观 测

Surveying

目 的

本章的目的旨在强调可摘局部义齿设计过程中牙科观测器的重要作用。

Aim

The aim of this chapter is to emphasise the essential role of the dental surveyor in the design process of partial dentures.

要 点

阅读本章后，从业医师应该懂得利用牙科观测器来确定可摘局部义齿的就位道，并且掌握影响选择就位道的因素。

Outcome

After reading this chapter, the practitioner should understand the use of a dental surveyor to determine the path of insertion of a partial denture and be aware of the factors that influence the choice of the path of insertion.

引 言

在第3章中的"功能稳定"和"预防伤害"大标题下已经探讨过可摘局部义齿设计的基本原则，从更实用的角度来看，我们的目标应该是使义齿的最终设计满足以下条件：

- 患者取戴义齿容易
- 对抗脱位力
- 外观令人满意
- 避免造成令人不快的食物嵌塞

Introduction

The basic principles of partial denture design were considered in Chapter 3 under the broad headings of "stability in function" and "prevention of harm". In more practical terms, the objective should be a finalised design that will allow the denture to:

- be easily inserted and removed by the patient
- resist dislodging forces
- be aesthetically pleasing
- avoid the creation of undesirable food

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• 将菌斑滞留降至最低

通过对患者的研究模型进行仔细评估就可以达到这些目的。这个辅助检查研究模型的仪器叫做“观测器”，这个过程被称为“观测”。

观　测

观测器实质上是由一个竖直固定在水平台上的分析杆构成（图6-1）。分析杆可以水平、上下移动。与水平台相连的是观测台，研究模型就固定在观测台上，它可以被安置在不同的水平面上。分析杆代表了义齿戴入和取出的路径——就位道，它可以随着观测台上研究模型倾斜程度的改变而改变。通过将分析杆紧贴模型上的牙齿和软组织区，就可以分析它们在各种就位道下的形态。图6-2列出了各种观测器工具。

对任何就位道来说，连接牙齿或软组织上最高点形成的连线叫做“观测线”。观测线以下的区域被称为这条就位道的倒凹区。将铅芯紧贴牙齿或软组织，每个倒凹区可以绘制出一个高观测线和一个低观测线，把它们最后连接起来就可以得出整个倒凹区的

traps

• minimise plaque retention.

This objective is achieved by a careful evaluation of a patient's study casts. The instrument used to aid the examination of the study cast is called a "surveyor" and the procedure is known as "surveying".

Surveying

The surveyor essentially comprises a vertical rod that is held perpendicular to a horizontal platform (Fig 6-1). The rod may be moved horizontally and up and down. Attached to the horizontal platform is the cast table to which the study cast is fastened. This may be positioned in various planes. The vertical rod represents the path along which the denture is inserted and removed - the path of insertion – and this can be altered by changing the tilt of the cast on the cast table. By positioning this vertical rod against the teeth and soft tissue areas of the cast, their morphology can be examined in relation to various paths of insertion. The various surveyor tools are illustrated in Fig 6-2.

For any given path of insertion, the contour line formed by joining points of maximum bulbosity on the teeth or soft tissues is termed the "survey line". Areas below the survey line are said to be undercut for that path of insertion. By placing a lead marker against the tooth or soft tissue, it

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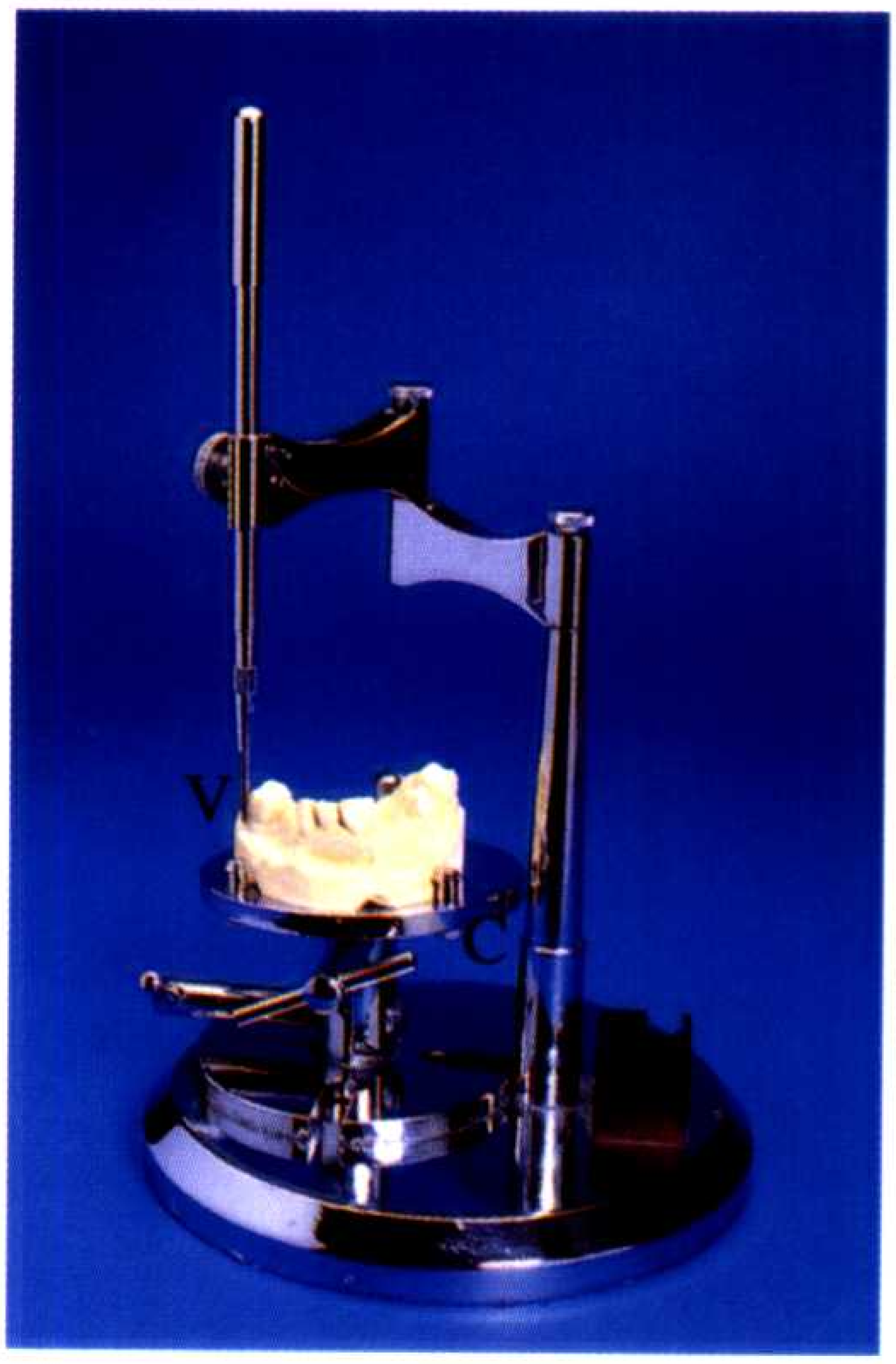


图 6-1 牙科观测器。分析杆（V）描绘出随观测台(C)上模型倾斜度变化而变化的就位道

Fig 6-1 A dental surveyor. The vertical rod (V) represents the path of insertion which can be changed by altering the tilt of the cast on the adjustable cast table (C)



图 6-2 观测器工具(自左至右)：分析杆，0.25、0.5 和 0.75 倒凹尺，观测铅芯，蜡凿

Fig 6-2 Surveyor tools (from left to right): analysing rod, 0.25, 0.5 and 0.75 undercut gauges, surveying lead, wax chisel

轮廓（图 6-3）。可摘局部义齿的任何刚硬部分都必须设计在观测区的倒凹区之外，只有弹性部分可以设计在倒凹区中。可摘局部义齿中惟一的弹性部分是卡环固位臂的末端。

观测线和倒凹区与既定就位道有关，就位道的改变会改变观测线和倒

should be possible to plot a high and low survey line for each undercut area. These should eventually join up and thus outline the entire undercut area (Fig 6-3). Any rigid part of the partial denture must be designed to lie outside of the surveyed undercut area and only flexible parts may be designed to go into it. The only flexible part of a partial denture is the terminal part of a retentive clasp arm.

Survey lines and associated undercut areas exist relative to a given path of

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凹区的分布（图6-4）。通过考虑各种因素，最终设计只容许一条精准的就位道（图6-5）。一旦就位道被确定，修复体的最后设计就可以完成了。在临床上，就位道往往是综合考虑这些互相抵触因素的结果。

insertion. Changing the path of insertion changes the survey line and undercut distribution (Fig 6-4). The final design should ideally permit a single precise path of insertion that is precisely determined by a consideration of the factors illustrated in

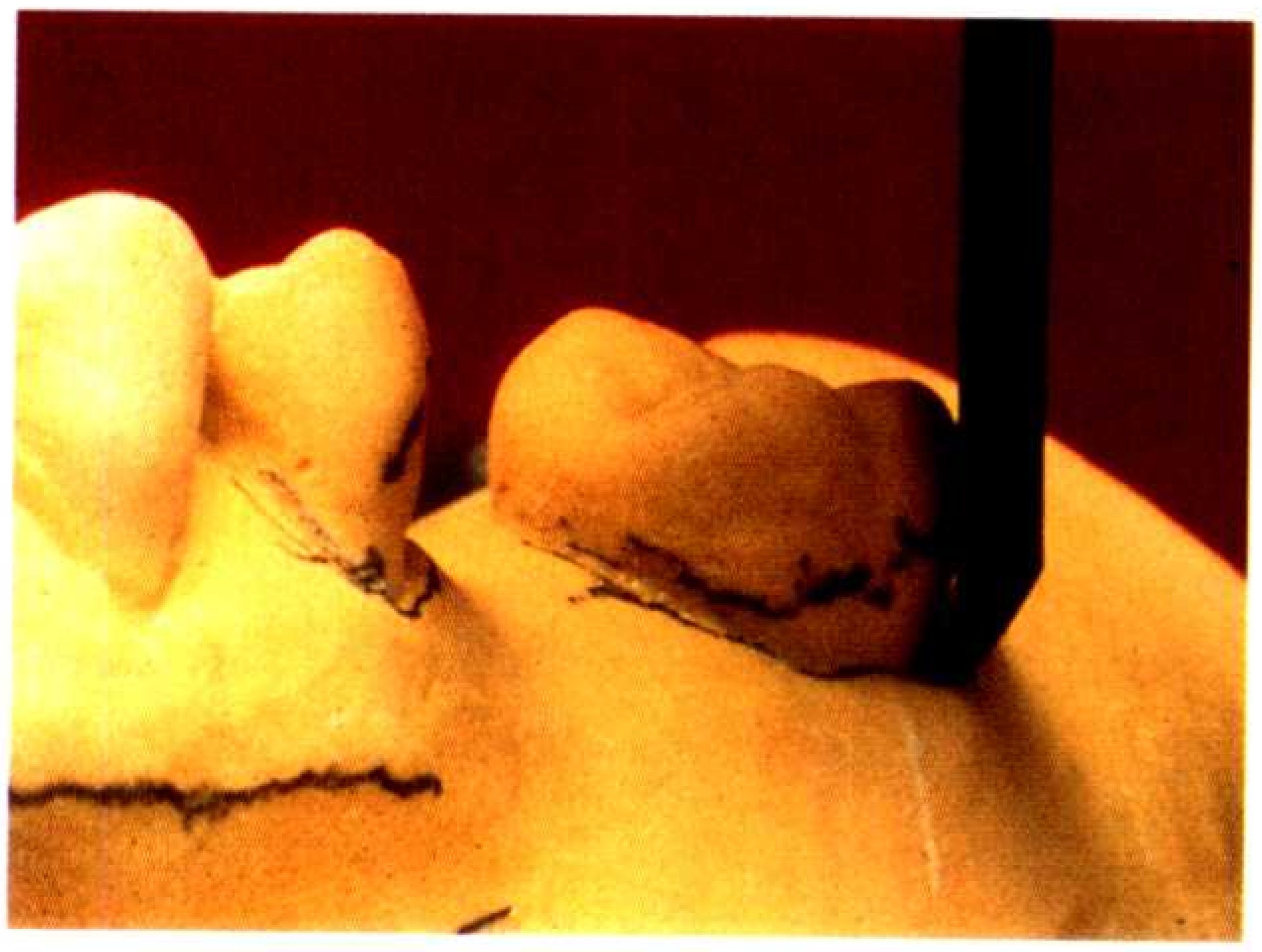


图6-3 上下观测线绘制出磨牙颊侧的倒凹区

Fig 6-3 Upper and lower survey lines mapping the undercut area on the buc-cal surface of the molar



图6--4 观测线和倒凹区随天然脱位道（红）和选定就位道（黑）不同而改变

Fig 6-4 The change in survey lines and undercut distribution for the path of natural displacement (red) and the chosen path of insertion (black)

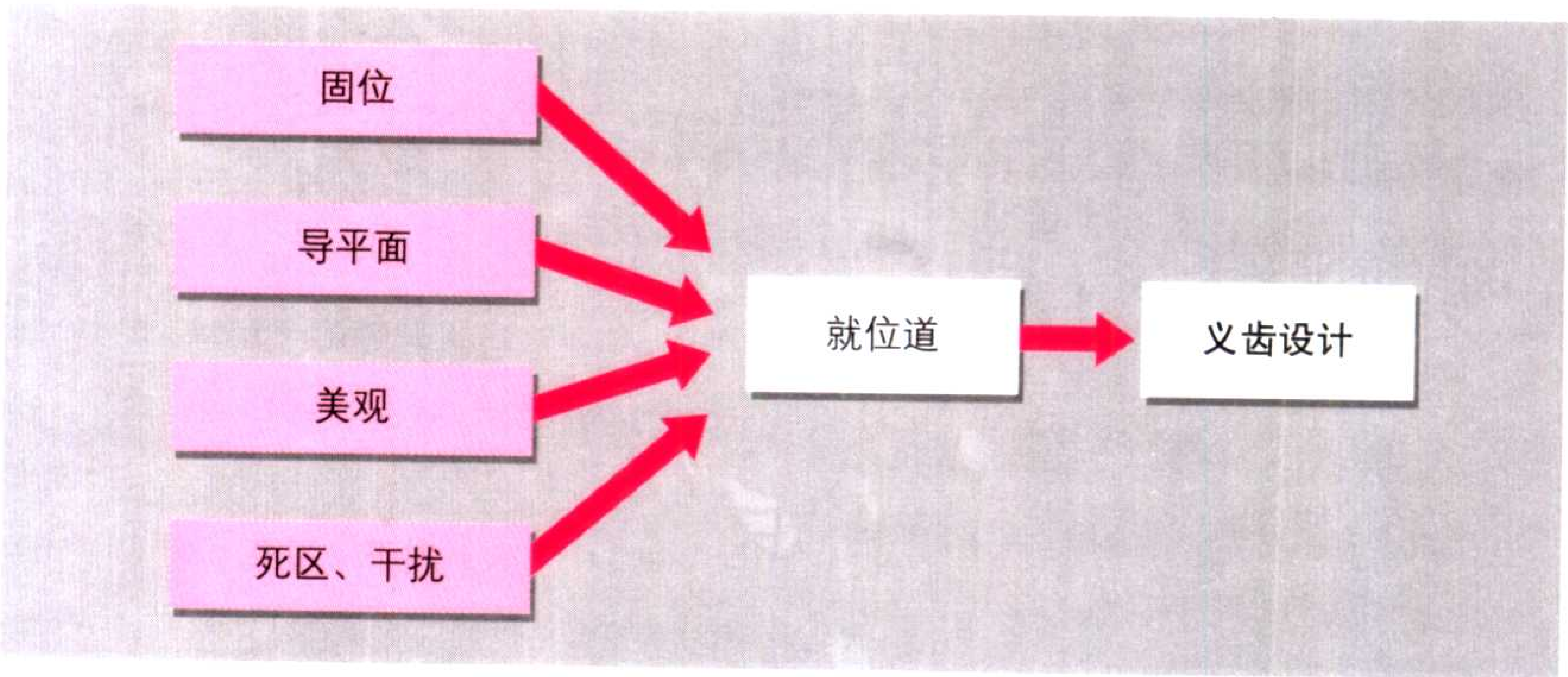


图6-5 影响选择就位道的因素。一旦这些因素确定下来，义齿的设计就可以完成了

Fig 6-5 Factors influencing the choice of the path of insertion. Once this has been determined the design of the denture can be completed

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Fig 6-5. Once the path of insertion has been decided upon, the final design of the prosthesis can be completed. In practice the path of insertion frequently has to be a compromise between these often conflicting factors.

固 位

当执行功能时，所有义齿都趋向于离开其支持组织，这主要是因为咀嚼时义齿与食物之间的黏附作用，在上颌，还有重力的作用。对于单个可摘局部义齿来说，这种脱位可能朝向不同的方向。然而，我们一般假定所有义齿都会有一个趋势，即沿着与殆平面垂直的路径——"天然脱位道"脱出。可摘局部义齿要获得固位，就必须提供这种天然脱位道方向上的阻力。这可以通过义齿的卡环或刚硬部分接触与天然脱位道相关联的倒凹区获得，有以下三种方式：

- 使用与殆平面垂直的就位道，即近似天然脱位道（图6-6）的方向放置卡环，这种情况下，固位就可能仅仅依靠卡环的效力了。适用于后牙区有界限鞍基的可摘局部义齿，使用"开放"性鞍

Retention

All dentures will tend to move away from the supporting tissues during function. This is largely because of adherence of the denture teeth to food during mastication and additionally, in the upper, to the effects of gravity. For an individual partial denture this displacement may be possible in several directions. However, it is generally assumed that all partial dentures will have a tendency to withdraw along a path at right angles to the occlusal plane —the "path of natural displacement". If the partial denture is to be retentive then resistance to this natural displacement must be provided. This is achieved by engaging retentive undercut that exists relative to the path of natural displacement with either clasps or rigid parts of the denture in one of the following three ways:

- With clasps using a path of insertion at right angles to the occlusal plane, i. e. similar to the path of natural displacement (Fig 6-6). In this case, retention is contingent upon the effectiveness of the clasps alone. The use

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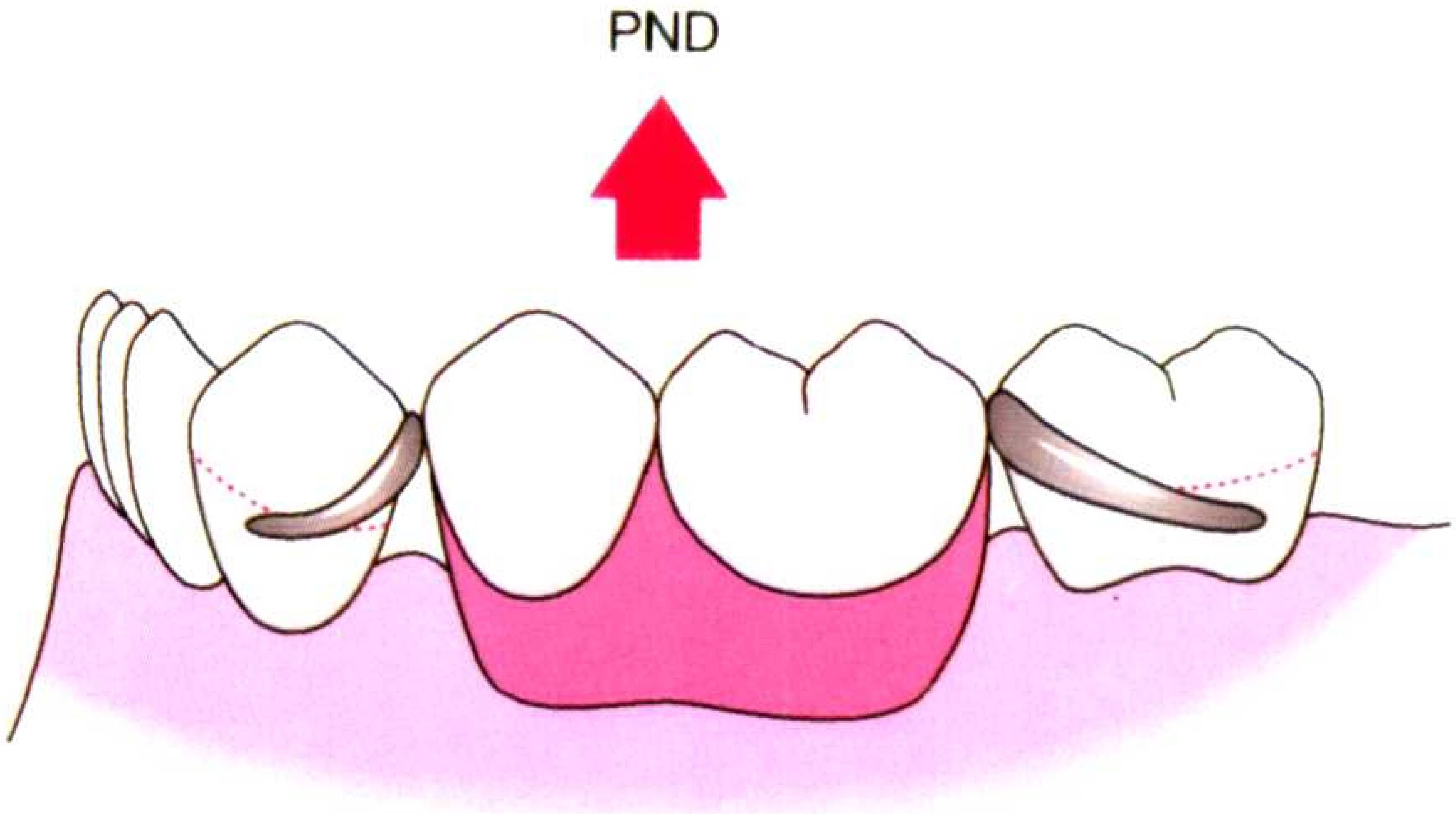


图 6-6 利用进入倒凹的卡环固位，就位道在天然脱位道（PND）方向

Fig 6-6 Retention using clasps engaging undercut present for the path of natural displacement (PND)

基－桥基牙关系。

- 选择一个不垂直于殆平面的就位道（图 6-7）。使用这种方法，义齿刚硬部分就可以置于在天然脱位道时属于倒凹区的地方了。一个例子是在游离端鞍基义齿中，为对抗天然脱位，可将鞍基置入桥基牙的远中倒凹。通常形成"闭合"性鞍基－桥基牙关系。很明显，刚硬部件会比弹性卡环臂更利于对抗天然脱位。然而，在实践中，这种方法的成功在很大程度上取决于使用有效的导平面来限制和加强就位道（"导平面"见后）。

of "open" saddle–abutment relationships in the posterior bounded partial denture dictates this approach.

- By selecting a path of insertion that is clearly not at right angles to the occlusal plane (Fig 6-7). Using this approach, rigid parts of the denture can be placed in areas which are undercut relative to natural displacement. One example is the free-end saddle denture in which resistance to natural displacement is provided by the saddle engaging undercut distal to the abutment tooth. This normally results in a "closed" saddle–abutment relationship. Reasonably one would expect a rigid component to provide more resistance to natural displacement than a flexible retentive clasp arm. In prac-

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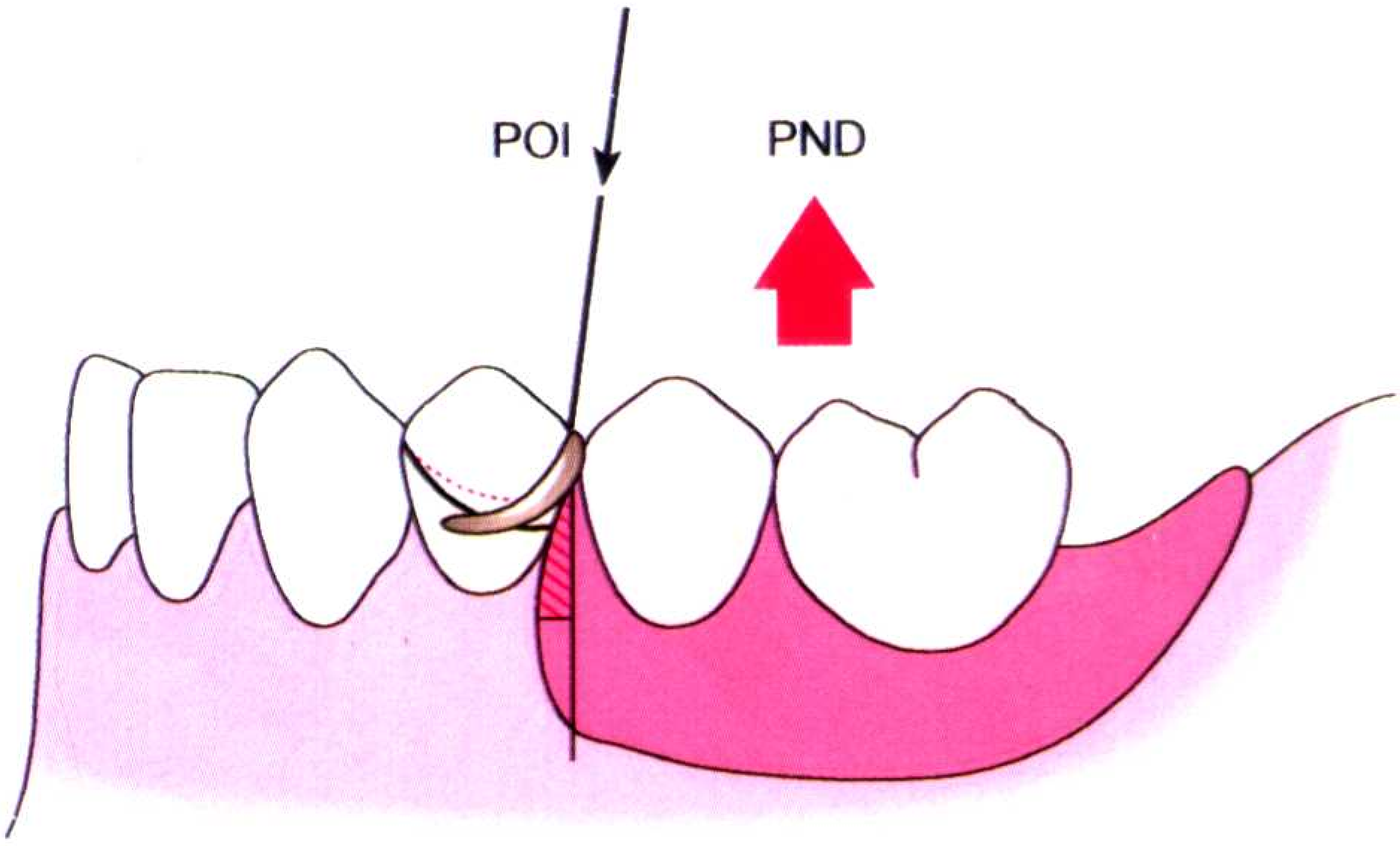


图6-7 通过改变就位道（POI），义齿的刚性部分（本例中是丙烯酸树脂基托）可以进入远中桥基牙邻面，这在天然脱位道（PND）时属于倒凹区

Fig 6-7 By altering the path of insertion (POI) rigid parts of the denture (in this case the saddle acrylic) can engage areas of the proximal surface that are undercut relative to the path of natural displacement (PND)

tical terms, however, the success of this approach is very much dependent upon the use of effective guide surfaces to restrict and reinforce the chosen path of insertion (see Guide surfaces later).

- 以上两种方法的综合。这可能是保证固位力的最有效的方法。修复前牙的可摘局部义齿就是一个很好的例子（图6-8），选择就位道使唇侧倒凹减小，允许刚硬的唇侧基托就位，进入在天然脱位道时属于倒凹区的地方，后牙卡环设计在就位道和天然脱位道共同的倒凹区。

- A combination of both of the above approaches. This is perhaps the most effective way of ensuring retention. A good example is partial dentures replacing anterior teeth (Fig 6-8). A path of insertion is chosen that reduces labial undercut and allows seating of the rigid labial flange. This area is undercut relative to the path of natural displacement. Clasps on posterior teeth are then designed to engage undercut

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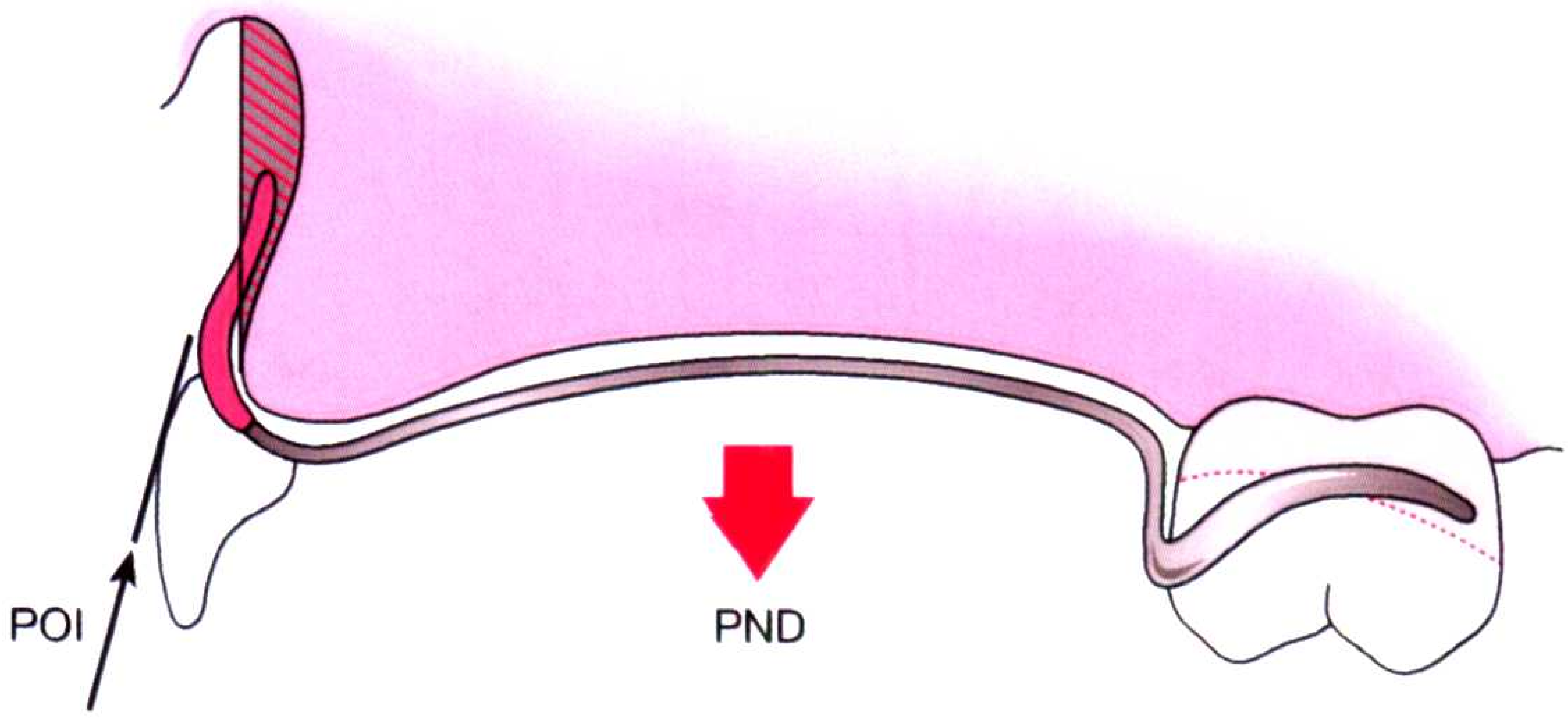


图 6-8 选择图例中的就位道（POI），可以使刚硬的唇侧基托置于在天然脱位道（PND）时属于倒凹区的地方，磨牙上的卡环设计为 POI 和 PND 的共同倒凹区

Fig 6-8 Choosing the illustrated path of insertion (POI) allows placement of a rigid labial flange in areas undercut relative to the path of natural displacement (PND). The clasps on molar teeth are then designed to engage undercut common to both the POI and PND

common to both the planned path of insertion and the path of natural displacement.

总而言之，如果有足够的理由选择不同于天然脱位道的就位道，那么卡环应设计在二者共同的倒凹区内。如果可以提供倒凹，并且没有其他理由改变就位道，那么利用天然脱位道作为就位道是最好的。就位道并不是一定要与天然脱位道不同。

In summary, if there is a good reason to choose a path of insertion that differs from the path of natural displacement, clasps should be designed to engage undercut relative to both paths of withdrawal. If retentive undercut for clasps is available and there is no other reason to alter the path of insertion, use of the path of natural displacement as the path of insertion is perfectly acceptable. The chosen path of insertion does not have to differ from that of natural displacement.

理想的卡环倒凹应该是平均分配的，即倒凹不能在某些桥基牙中很深，

Ideally the clasp undercuts should be equally distributed, that is they should not

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而在另一些桥基牙中很浅，但这样的要求并不是总能满足，只有通过对就位道做微小调整才有可能改进这些倒凹。当在某一合理的就位道下倒凹太小或不存在时，通常采用修复的方法形成倒凹，而不是勉强将就。必须等到倒凹分配明确以后才能决定最后的卡环设计。

be very deep on some abutment teeth and very shallow on others, but this cannot always be achieved. Only minor modifications to the path of insertion should be made to improve these undercuts. Where little or no clasp undercut exists for an otherwise reasonable path of insertion, it is usually preferable to create undercuts by restorative means rather than to compromise the path of insertion. The final design of the clasps must always be deferred until the retentive undercut distribution has been revealed.

导平面（导板）

导平面是一系列与就位道平行，并且相互之间也平行的平面，它们保证义齿能够沿着选定的就位道取戴（图6-9）。导平面至少要有2～3mm长才有效。限定就位道和脱位道在理论上有几个优点：

Guide surfaces (guiding planes)

Guide surfaces are a series of surfaces parallel to each other and the path of insertion that ensure that the dentures can be inserted or withdrawn along the selected path of insertion (Fig 6-9). To be effective they should be at least 2—3 mm long. The restricted path of insertion and withdrawal has in theory several advantages:

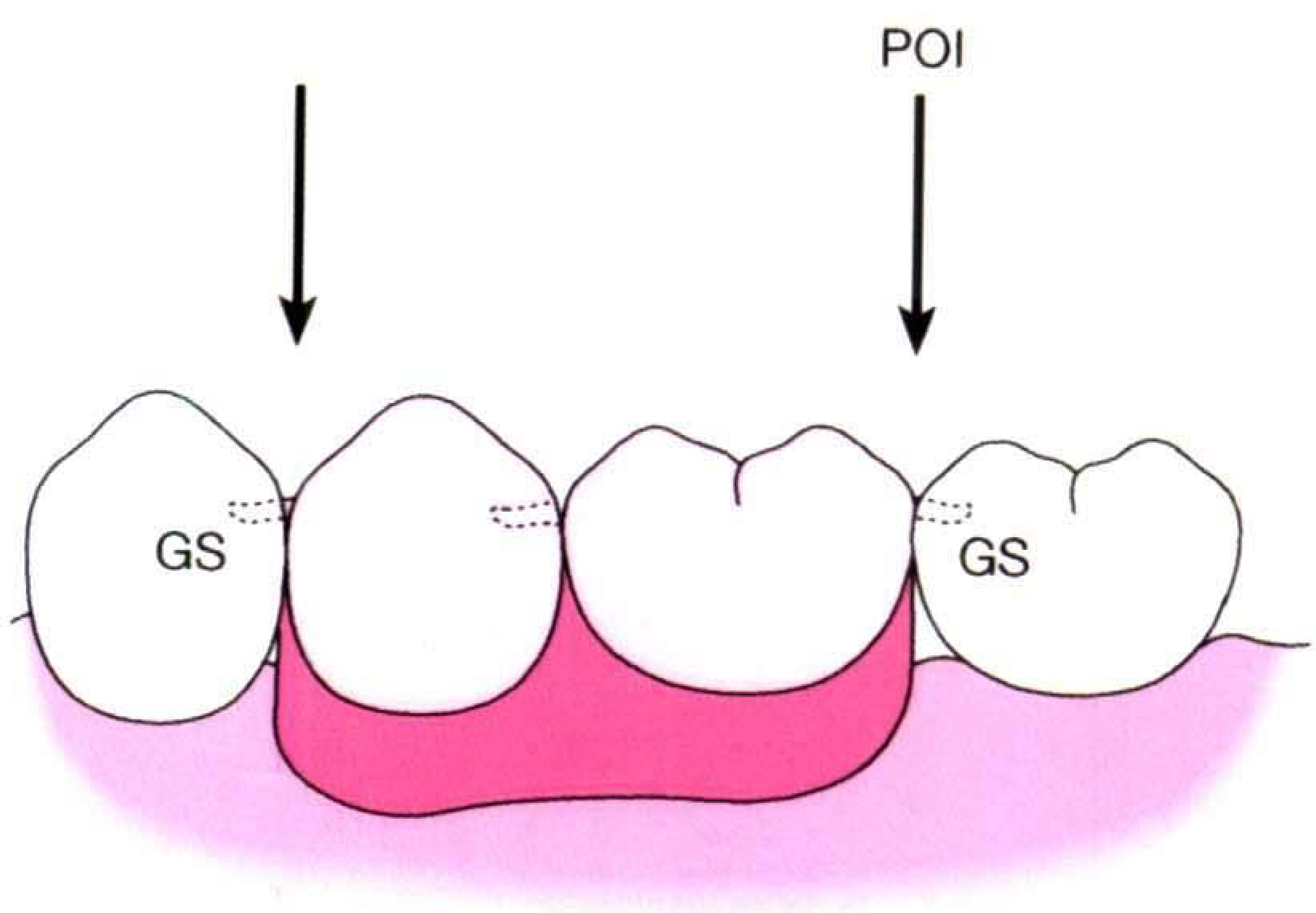


图6-9 导平面（GS）与预期就位道平行，限制了可摘局部义齿的脱位可能

Fig 6-9 Guide surfaces (GS) parallel to the intended path of insertion restrict the possible paths of withdrawal of the partial denture

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• 提高卡环的功能——要记住倒凹只能伴随选定的就位道和脱位道存在。如果义齿可以沿着相对而言没有倒凹区的其他路径脱位，那么固位力就不存在了。因此限定脱位道保证了设计倒凹区的可预见性。此外，当对抗卡环臂或板接触了导平面，那么当义齿从组织上离开时它们就能保持与牙面的接触，对抗作用的维持可以使弹性卡环臂在离开倒凹时必须要弯曲。最后，如果存在另一个就位道的话，限定就位道杜绝了弹性固位臂发生形变的可能性。

• 使患者取戴义齿容易。

• 义齿部件与导平面摩擦接触会增强可摘局部义齿的整体固位力。

• 减少死区——本章稍后将更详细地阐述死区的处理。

导平面的完美例子是精密附着体。

• Improved clasp function – It should always be remembered that an undercut exists only in relation to the chosen path of insertion and withdrawal. If the denture can be displaced along another path there may be no undercut relative to this other path and effective retention is illusory. A restricted path of withdrawal therefore ensures the predictability of the planned retentive undercut. Further, when reciprocal clasp arms or plates contact guide surfaces their contact against the tooth is maintained as the denture moves away from the tissues. Effective reciprocation is maintained and the flexible retentive clasp arm must flex if it is to withdraw from undercut. Finally, a restricted path of insertion prevents the possible distortion of the flexible retentive clasp arm that can occur if another path of insertion could be used to seat the denture.

• Ease of insertion and removal of the denture by the patient.

• Frictional contact of denture components against guide surfaces may assist the overall retention of the partial denture.

• Reduction of dead space – The management of dead spaces is described in more detail later in this chapter.

The perfect example of a guide surface

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其次是在桥基牙铸造冠修复体中预备的平行平面，此时，桥基牙往往需要做大面积充填（图6-10）。也可以通过磨除桥基牙表面釉质来制备导平面，虽然制备数个与就位道平行并且相互之间也平行的牙面的机会并不大（见第10章）。在没有充填、也没有制备过的牙釉质表面，通常可以发现一些桥基牙表面相互平行。如果被支架包绕，即便是牙体上三条远远分开的平行线也会有效。

支架组织面上的长平行平面也能有效地用作导平面。虽然牙面并不是很平行，而且义齿仅仅是在表面线上接触牙体，但这种方法还是能够提高就位道的稳定性。

is a precision attachment. Next in order of effectiveness are prepared parallel surfaces incorporated into cast coronal restorations on abutment teeth where extensive restoration is required (Fig 6-10). Guide surfaces also may be prepared by grinding the surface enamel of abutment teeth although the chances of creating several tooth surfaces that are parallel to each other and the path of insertion are limited (see Chapter 10). In the absence of restoration or preparation of the enamel surfaces of the teeth, it is usually possible to find some surfaces of the abutment teeth that are parallel to each other. Even three widely spaced parallel lines on the teeth will be effective if they are enclosed by the framework.

Long parallel surfaces on the fitting surface of the framework can effectively act as guide surfaces. Although the tooth surfaces are not quite parallel and the denture contacts the teeth only at the surface line, such an approach can improve the stability of the path of insertion.

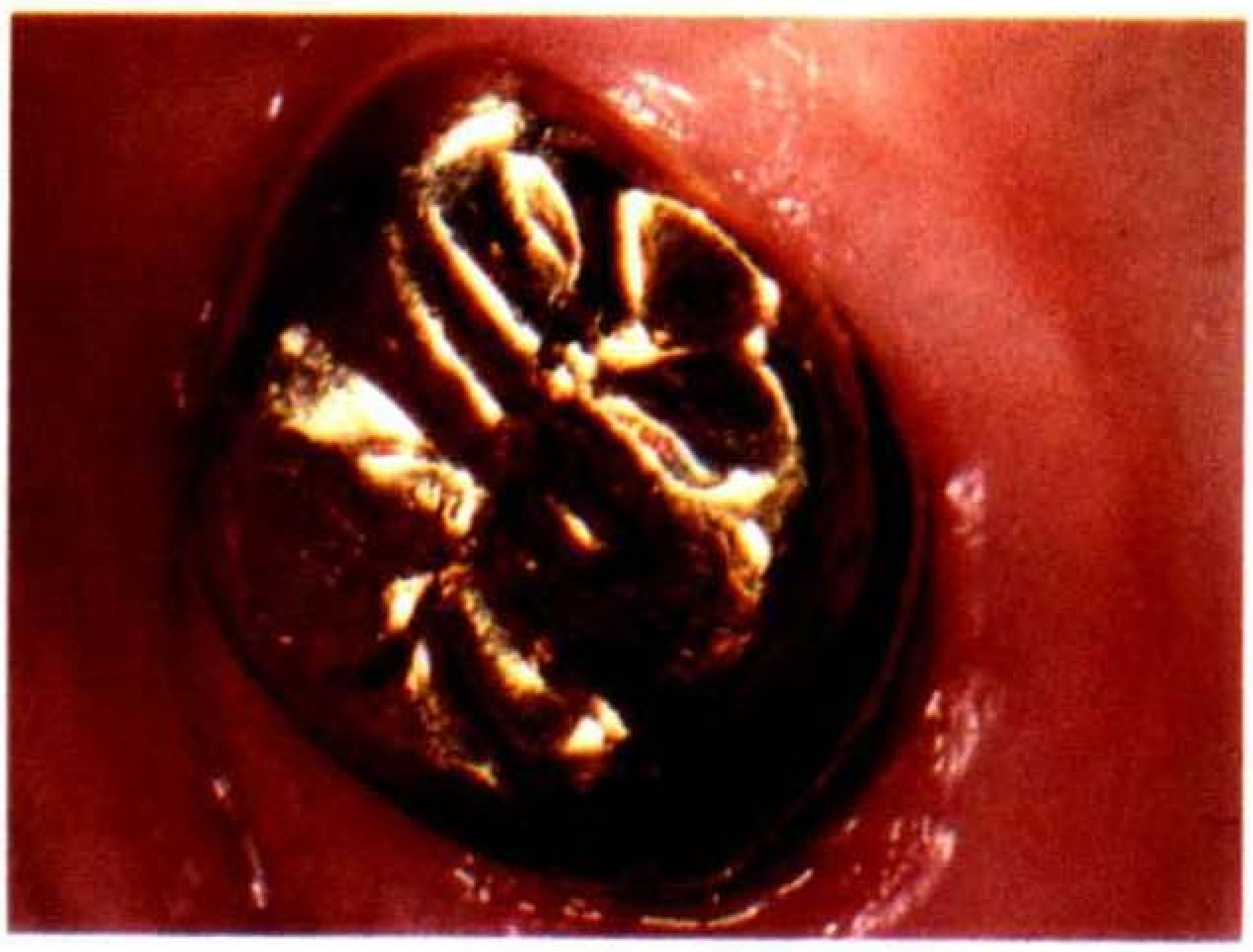


图6-10 导平面在冠套修复的上颌磨牙的近中面和舌面上。舌侧导平面组成研磨肩台的一部分，用于容纳卡环对抗臂

Fig 6-10 Guide surfaces on the mesial and lingual surfaces of a crowned upper molar abutment tooth. The lingual guide surface forms part of a milled shoulder that will house the reciprocal clasp arm

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经常有报道认为有效的导平面会大幅度降低可摘局部义齿对固位卡环的依赖程度，然而没有充分的证据支持导平面对可摘局部义齿长期功效的正面作用，尤其是当联系到可摘局部义齿潜在的长期损害来看的时候。关于可摘局部义齿设计的现代观念很少强调导平面的意义和需要，并且肯定反对仅仅为了制备有效的导平面就为健康牙齿制作冠套。

It is often reported that effective guide surfaces greatly reduce the reliance on clasps for retention of the partial denture. However, evidence supporting the advantages they may offer for the long-term function of partial dentures is lacking, in particular when viewed in the context of the potential long-term harm associated with partial denture use. Current concepts of partial denture design place much less emphasis on the significance of and the need for guiding surfaces and would certainly deprecate the crowning of otherwise sound abutment teeth for the sole purpose of creating effective guide surfaces.

美　观

可摘局部义齿金属部件的显露应该降到最小程度，虽然这可能不明智地牺牲了义齿的稳定性，但明显的或不雅观的卡环会使患者难以接受。前牙上的卡环尖应该放置在近龈缘或者牙体远中面（图6-11）。对于殆向式卡环，利用近中倒凹会使卡环臂的2/3留在牙体远中面仅卡环尖趋近龈缘；对于龈向式卡环，最好利用远中的倒凹，这样固位臂就不会很明显了。

Aesthetics

The visible display of metal components of a partial denture should be kept to a minimum. Although it may be unwise to sacrifice denture stability, poor patient acceptance can be associated with visible or unsightly clasps. Clasp tips on anterior teeth should be positioned towards the gingival margins or on the distal surfaces of the teeth (Fig 6-11). With an occlusally approaching clasp, use of a mesial undercut will allow the proximal two-thirds of the arm to remain distal to the tooth and the tip towards the gingival margin. For a gingivally approaching clasp, it may be better to use a distally placed undercut so that the arm of the retainer is less visible.

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修复前牙缺失时，为了消除修复体和桥基牙之间的空隙以及使用唇侧基托（如果有必要）将会严重限制就位道的选择（图6-12），这种情况常见于向下倾斜模型的后部。

When replacing lost anterior teeth, the elimination of unsightly gaps between replacement and abutment teeth and the use of a labial flange (if required) will severely restrict the choice of a path of insertion (Fig 6-12). This will normally be from the back of the cast tilted down.

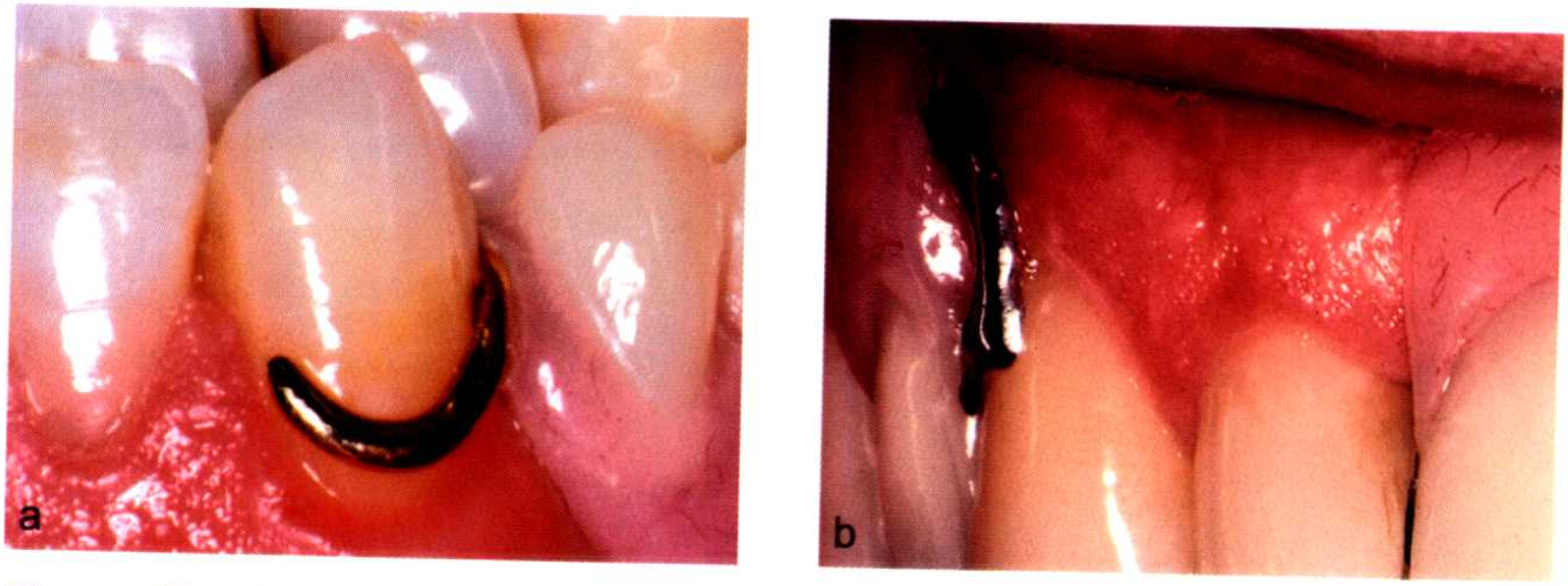


图6-11 戴入式卡环的美观放置：a. 殆向；b.龈向

Fig 6-11 Aesthetic positioning of (a) occlusally and (b) gingivally approaching clasps

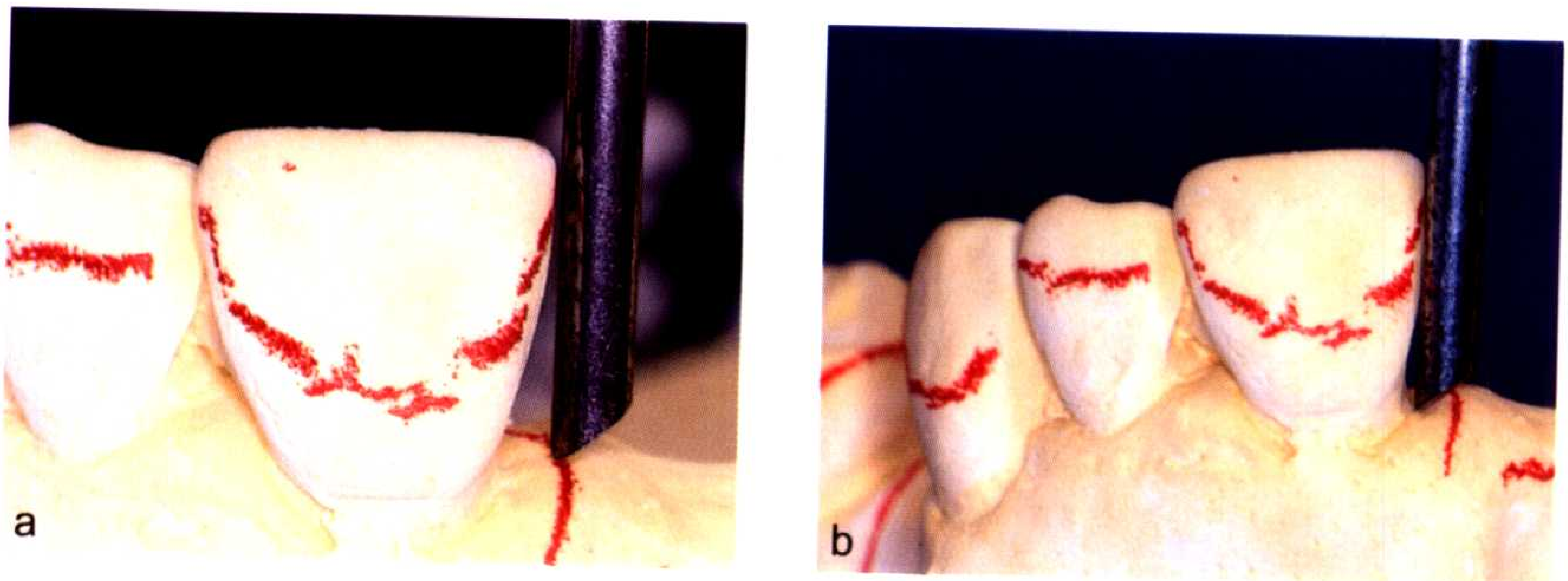


图6-12 a. 采用天然就位道时，左上颌中切牙近中有潜在间隙；b. 这种情况下使用由前向后的就位道，加上轻微的侧倾就减小了这种间隙，也可以使用唇侧基托

Fig 6-12 (a) Potential spacing mesial to UL1 associated with the path of natural spacing, (b) The use of a path of insertion from before backwards and, in this case, a slight lateral tilt has reduced this space and will also allow the use of a labial flange

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死区和干扰

死 区

任何位于桥基牙表面在导线下方与可摘局部义齿支架相邻的，或者其他牙齿上被支架包绕的不利倒凹都被称为"死区"（图6-13a）。这些地方易于聚集和滞留食物残渣，应该尽量减小或者保持足够宽敞以帮助自洁。死区可以用以下几种方式来处理：

- 通过去除一部分牙体组织消除死区（图6-9）。这可以通过制备导平面来实现，并且通常不需要磨穿釉质就可以完成。然而，如果桥基牙严重倾斜，需要磨除的组织太多，死区就只有通过冠套修复来消除。

- 在制作可摘局部义齿的过程中有意扩大死区（图6-13b）。这就形成了"卫生的"开放性鞍基－桥基牙关系，通常用于后牙牙支持式鞍基。这种情况下，对抗天然脱位道的固位力来自于进入相关倒凹区中的卡环臂。

Dead spaces and interferences

Dead spaces

Any unwanted undercut area beneath the survey line on the surface of the abutment tooth next to the partial denture framework, or on other teeth enclosed by the framework, is termed "dead space" (Fig 6-13a). These represent sites where food debris can collect and stagnate and should be either minimised or kept large enough to aid natural cleansing. Dead spaces may be managed in several ways:

- The elimination of dead spaces by the removal of tooth substance (see Fig 6-9). This can be achieved by the preparation of guide surfaces and can often be performed without penetration of enamel. However, if the abutment teeth are heavily tilted, the amount of tooth tissue to be removed will be such that elimination of the dead space can only be achieved with coronal coverage restorations.
- By the deliberate enlargement of dead spaces during construction of the partial denture (Fig 6-13b). This results in "hygienic" open saddle—abutment relationship and commonly applies to posterior tooth-supported saddles. In this case, retention relative to the path of natural displacement must be provided by clasp arms that engage un-

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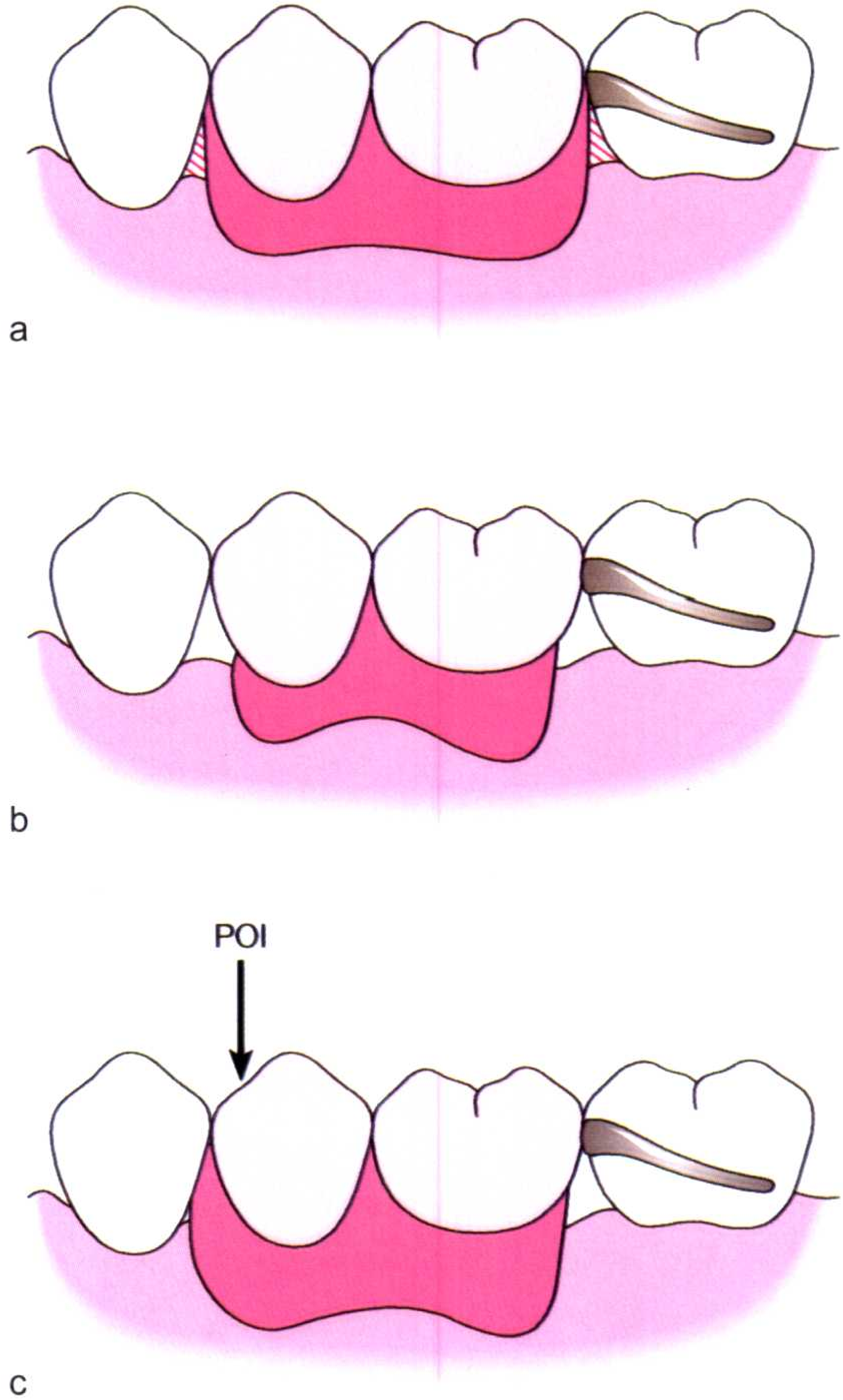


图6-13 a. 位于鞍基和桥基牙之间的死区；b. 通过有意扩大的方法来处理；c. 通过选择就位道（PDI）消除近中桥基牙远中不利死区来处理

Fig 6-13 Dead spaces between the saddle and abutment teeth (a) managed by deliberate enlargement (b) and a path of insertion (POI) that eliminates the unwanted dead space distal to the mesial abutment tooth (c)

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dercut relative to this displacement.

- 通过选择就位道来消除不利的倒凹（图6-13c）。这种方法具有避免桥基牙和人工牙之间不雅观间隙的附加优势，尤其是在修复前牙时。它也有功能方面的优点，即允许义齿刚硬部分进入与天然脱位道相关的倒凹区从而对抗天然脱位。后牙的有界限鞍基往往导致远中桥基牙近中死区的增加。

- By choosing a path of insertion that eliminates the unwanted undercut areas (Fig 6-13c). This approach has the additional advantage of avoiding unsightly gaps between the abutment and replacement teeth in particular, when replacing anterior teeth. It further offers the functional advantage of resisting displacement by allowing placement of rigid parts of the denture in areas undercut relative to the path of displacement. The presence of posterior bounded saddle, frequently results in an increase in dead space mesial to the distal abutment tooth.

虽然食物嵌塞会给患者带来不便，但无论是消除死区（闭合性鞍基－桥基牙关系）还是扩大死区（开放性鞍基－桥基牙关系）的效果都不确定。虽然减小死区具有功能和美观方面的优点，但消除死区的观点本身并未得到证实。从可摘局部义齿的长期效果来看，建立有效的菌斑控制更加重要。

Although food accumulation can inconvenience the patient, the effect of either the elimination of dead spaces (a closed saddle—abutment relationship) or their enlargement (an open saddle–abutment relationship) is not proved. Although there are functional and aesthetic advantages associated with the reduction of dead spaces, the concern to eliminate dead spaces *per se* is not justified and the establishment of effective plaque removal is of much greater significance for the long-term effectiveness of a partial denture.

干　扰

Interferences

牙齿和软组织的外形或位置可能会物理性阻碍义齿刚硬部分沿着一个

Teeth and soft tissues may be formed or positioned so as to physically obstruct the

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合适的就位道就位（图6-14），这就是干扰。最常见的干扰大概是舌倾的前磨牙和切牙，其他的干扰包括妨碍舌侧大连接体应用的下颌骨隆突，以及无牙颌牙槽嵴上妨碍义齿鞍基正常伸展的骨性膨大。

placement of rigid denture components along an otherwise appropriate path of insertion (Fig 6-14). They are then said to act as interferences. Perhaps the most common are lingually tilted premolars and incisors. Other examples are mandibular tori that prevent the use of lingual major connectors, and bony enlargements of the edentulous ridge that prevent the normal extension of the denture saddle.

为了避免干扰，选择就位道时可能导致倒凹分布不良和外观打折扣。这种情况下应该考虑去除干扰以获得更合适的就位道，制作功能更好的修复体。

A path of insertion that avoids interferences may result in a poor distribution of retentive undercuts and a compromised appearance. In such instances, consideration should be given to the removal of interferences to allow a more appropriate path of insertion and will result in a more functional prosthesis.

实际观测

设计既有效又适合患者牙齿状况的可摘局部义齿是口腔医师的责任。

Practical Surveying

It is the dentist's responsibility to design a partial denture that is both effective and

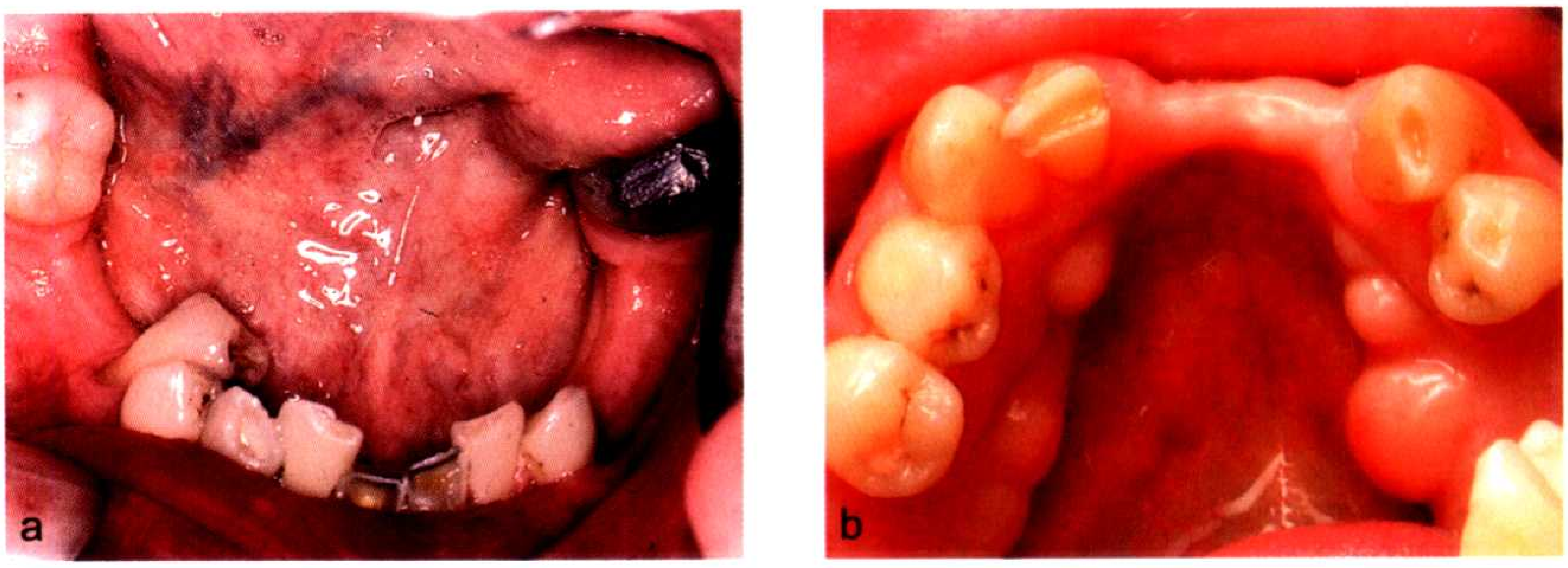


图6-14 干扰的例子：a. 前磨牙舌倾；b. 下颌骨隆突

Fig 6-14 Examples of interferences: (a) lingually tilted premolar; (b) mandibular tori

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观测是设计过程的重要组成部分，用于确立合适的就位道，使得义齿不但获得足够的固位力同时尽量不影响美观。遗憾的是一些调查指出多数从业医师借口说缺乏时间、自信或者技巧，把这个职责转嫁给了口腔科技师。本书作者强烈主张可摘局部义齿的设计，包括观测，是临床医师的职责。技师根本没有建立适合个体患者的义齿设计的必需临床资料。为了便于医师承担这一临床职责，将在第9章（临床指导Ⅱ：确定义齿的设计）中阐述一种可以被从业医师很容易掌握的简单合理的方法，用于有效而合适的可摘局部义齿设计。

relevant to the patient's dental status. Surveying is an essential part of the design process that identifies an appropriate path of insertion, allowing partial denture designs that provide effective retention and minimise the aesthetic limitations. Regrettably, several surveys have shown that the majority of practitioners abrogate this responsibility to the dental technician, a practice justified by reasons such as a lack of time, confidence or skills. It is the present author's strong contention that the design of partial dentures, including surveying, is a clinician's responsibility. A technician will simply not have the clinical information necessary to establish a partial denture design that is appropriate to the individual patient. To facilitate this clinical responsibility, a simple and logical system for effective and relevant designs for partial dentures that can be easily followed by a practitioner is described in Chapter 9 (Clinical Guide II: Establishing the Denture Design).

重 点

- 模型观测是可摘局部义齿设计过程中的重要组成部分，用于确定合适的就位道。
- 确立就位道的决定因素是固位、美观，其次还有导平面、死区和干扰等因素。

Key Points

- Cast surveying is an essential element of the design process for partial dentures that establishes an appropriate path of insertion.
- The path of insertion is determined by a consideration of retention and aesthetics and, to a lesser extent, guide

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surfaces, dead spaces and interferences.

- 就位道一旦被确定，义齿的设计就可以完成了。
- 设计可摘局部义齿是临床医师的职责，不应该委派给口腔科技师。

- Once the path of insertion has been chosen, the design of the denture can be completed.
- Designing partial dentures is a clinician's responsibility and should not be delegated to the dental technician.

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第7章 过渡性可摘局部义齿

Transitional Partial Dentures

目 的

本章描述了在提供最终修复处理期间的可摘局部义齿。它可以作为临时修复体来维持患者的美观和功能，或者说是作为辅助过渡到无牙颌。

Aim

This chapter describes partial dentures used as interim prostheses to maintain patients' appearance and function during the period of provision of definitive restorative treatment or as an aid to the transition to edentulousness.

要 点

阅读本章后，从业医师应该了解使用和设计过渡性可摘局部义齿的适应证，能够认识到当最终不再可能使用局部义齿修复的情况下，需要计划一个向无牙颌的过渡，这是一个可以通过使用过渡性可摘局部义齿予以有效辅助的渐进过程。

Outcome

After reading this chapter the practitioner should be aware of the indications for the use and the design of transitional partial dentures. It should be possible to recognise the circumstances when the use of definitive partial dentures is no longer possible and a planned transition to edentulousness is necessary, a gradual process that can be effectively aided by the use of transitional, trainer partial dentures.

引 言

在完成对局部缺牙的最终处理期间，可摘局部义齿常被作为临时治疗来维持患者外观和殆稳定。当余留牙最终全部丧失、无法避免使用全口义

Introduction

Partial dentures are often used as an interim treatment that serves to maintain appearance and to provide and maintain occlusal stability during the implementation

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齿时，也可以作为辅助过渡到无牙颌。这些可摘局部义齿本质上是临时的，所以被称为过渡性可摘局部义齿。

of treatment to definitively restore a partially edentulous mouth. They are also used as an aid to the transition to edentulousness when the eventual loss of all remaining teeth and the use of complete dentures seem inevitable. These partial dentures are by nature temporary and are termed transitional partial dentures.

过渡性义齿的设计

已经确立的适用于最终可摘局部义齿的设计原则同样也适用于过渡性义齿。然而，考虑到它们的临时性，我们常常通过使用丙烯酸树脂来制作义齿和采用黏膜支持来简化设计（图 7-1）。基托的广泛伸展是一个重要的设计特点，既可以减小黏膜上的负荷，又可以保证相对较弱的丙烯酸树脂足够的强度。固位力的获得来自于基托伸展区与组织面的附着力，来自于人工牙和桥基牙之间的紧密点接触，以及从长远观点来看，来自于患者的肌肉控制。

Design of Transitional Dentures

The principles of design already established for definitive partial dentures apply equally to transitional dentures. However, given their temporary nature, it is usual to simplify the design and construction by making the dentures in acrylic resin and by deriving support from the mucosa (Fig 7-1). A broad extension of the denture base is an important design feature that is used to both minimise the load acting on the mucosa and to ensure rigidity of the denture given the relative weakness of acrylic resin. Retention is gained from adhesive forces

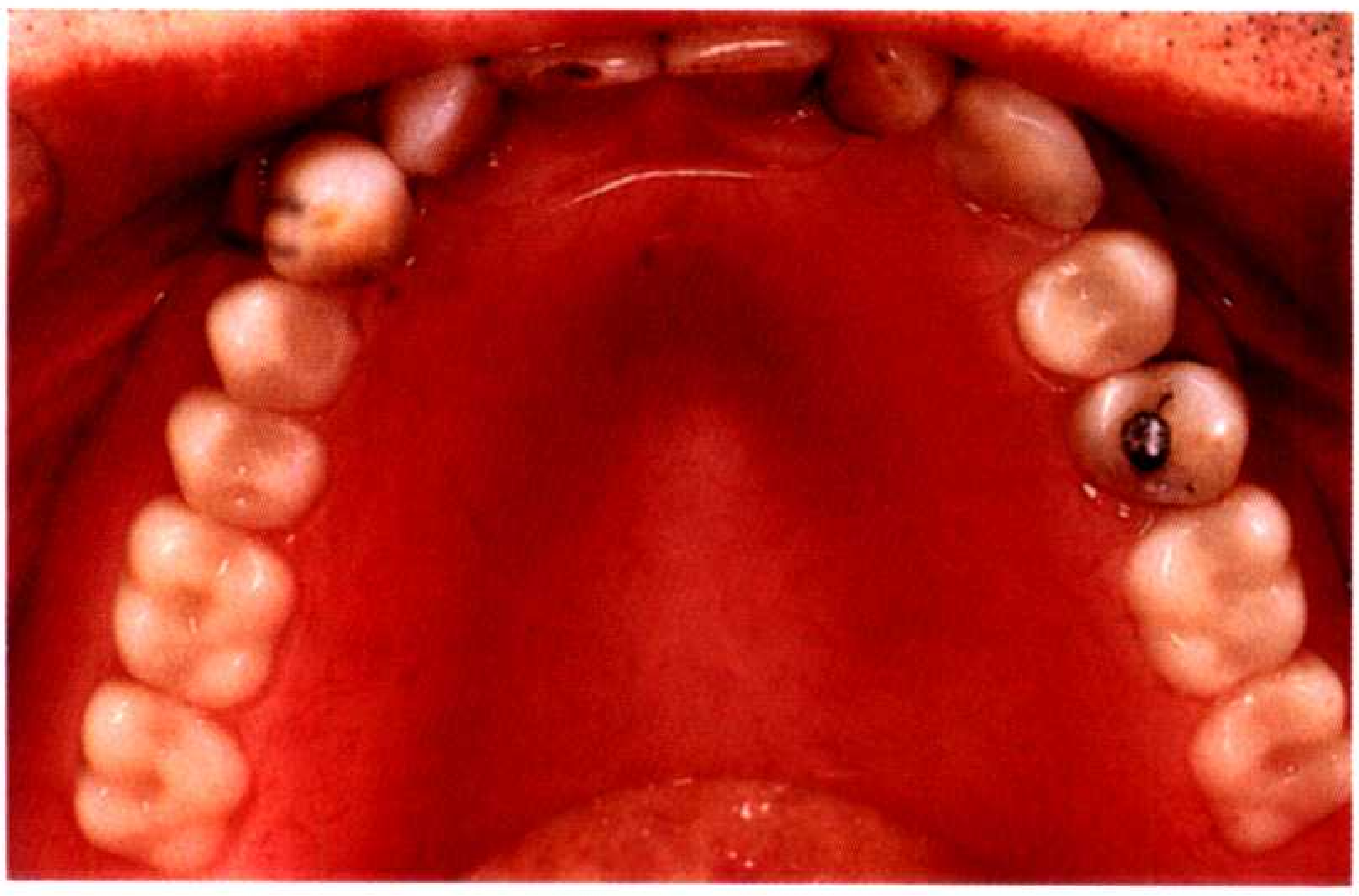


图7-1 一个简单的上颌全丙烯酸树脂、黏膜支持式过渡性可摘局部义齿，展示广泛伸展的义齿基托和义齿与桥基牙的紧密接触

Fig 7-1 A simple all-acrylic mucosally supported transitional upper partial denture demonstrating broad extension of the denture base and tight contacts between the denture and abutment teeth

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acting under the fitting surface of the broadly extended base, from tight point contacts between the replacement and abutment teeth and, in the longer term, from patient muscular control.

这种简单的、黏膜支持的丙烯酸树脂可摘局部义齿对牙周组织和牙槽嵴有高度潜在的长期危害，因此这些义齿不应该从过渡性义齿发展为永久义齿。这种危害的趋势可以通过以下几个方面来减小：

These simple, all-acrylic mucosally supported partial dentures have a high potential for long-term damage to the periodontal tissues and edentulous alveolar ridge. Therefore these dentures should not "progress" from the transitional to the permanent. This tendency to cause harm can be minimised in several ways:

- 使基托边缘离牙龈至少3mm。这对于上颌过渡性义齿是可能的，而且即使余留牙继续缺失，采用扩大树脂基托来修复缺失牙也是一个简单的技术问题。但对于下颌义齿则比较困难，因为强度和刚度的原因，丙烯酸树脂连接体要求设计为板状，此时可以通过使用锻造的钢质舌杆来获得龈缘间隙，不过它们的适合性和舒适度不太满意，而且进一步添加前牙也很困难。

- Clearing the denture base from the gingival margin by at least 3 mm. This is frequently possible with upper transitional dentures and is possible even if further tooth loss is anticipated as extension of the acrylic base to include further replacement teeth is technically a simple matter. Difficulties arise with lower dentures where the need for strength and rigidity of the acrylic connector will dictate a plate design. Clearance of the gingival margin can be achieved with wrought steel lingual bars although their fit and comfort are rarely satisfactory and the addition of further anterior teeth is difficult.

- 通过包埋在丙烯酸树脂里、锻造或铸造的支托来提供牙支持。这特别适用于龈缘被覆盖或者由于治疗计划需要长期使用过渡

- The provision of tooth support with wrought or cast rests embedded within the processed acrylic. This is particularly desirable where the gingival mar-

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性可摘局部义齿的患者。

gin is covered or where the long-term treatment plan results in prolonged use of a transitional partial denture.

- 可以使用锻造或铸造固位体获得增加的固位力。锻造固位体容易制作但常缺乏精密度，铸造卡环通过结合𬌗支托可以提供牙支持和更好的密合性，但确实需要更多的制作时间。不过，将它们的蜡型附加在另一个铸件的铸道上，和其他的铸件一起做，一同包埋和铸造，可以大大减少铸造所需要的时间。

- Additional retention may be gained with wrought or cast retainers. Wrought retainers are simple to fabricate but are not usually a precise fit. Cast clasps offer a more precise fit and additional tooth support through an integral occlusal rest but they do require more technical time. They may often, however, be made with other castings by attaching the wax pattern to the sprue system of another casting. Both are then invested and cast together. This reduces considerably the time required for casting.

图解这些特点的过渡性可摘局部义齿样例见图 7-2。

Examples of transitional partial dentures illustrating these features are shown in Fig 7-2.

过渡性可摘局部义齿的适应证

Indications for Transitional Partial Dentures

除现在最重要的指征——辅助过渡到全口义齿，使用过渡性可摘局部义齿的一般适应证如下。

Excluding for the moment the important indication – an aid to the transition to complete denture use – common indications for the use of transitional partial dentures are as follows.

即刻可摘局部义齿

Immediate partial dentures

当前牙拔除后，在快速骨吸收和重建初期，需要一个过渡性的义齿用于维持美观和保持间隙。常常在拔牙

When the extraction of anterior teeth is required a transitional denture may be used for aesthetic reasons and as a space main-

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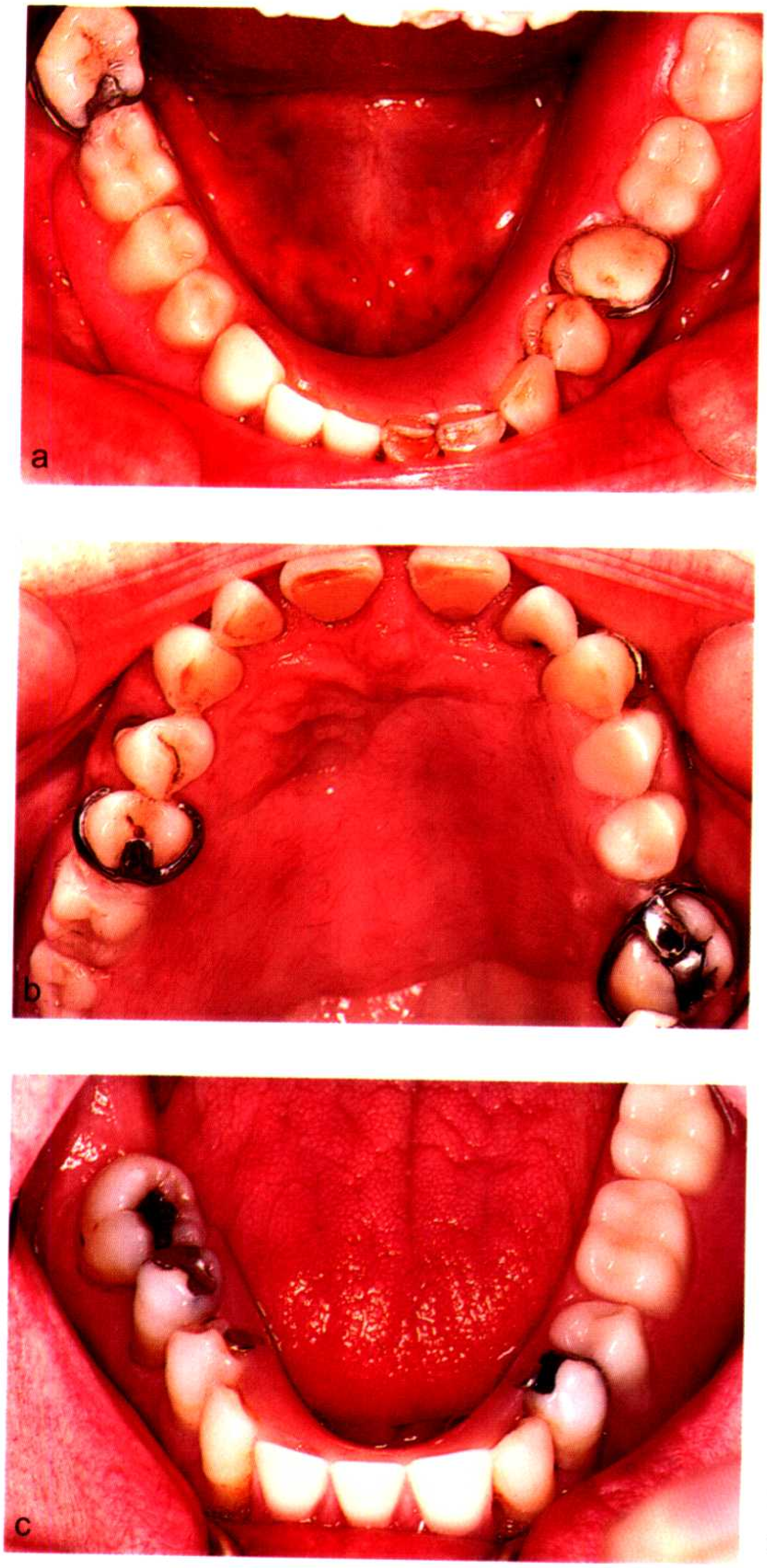


图7-2 过渡性可摘局部义齿的设计。a. 在下颌义齿的龈边缘留出空间是不大可能的，采用简单的不锈钢丝弯制卡环来增加固位；b. 在上颌很容易避免不必要的龈缘覆盖，添加铸造卡环可以提供更有效的支持和固位；c. 锻造的不锈钢支托

Fig 7-2 Design of transitional partial dentures, (a) Clearance of the gingival margin is rarely possible in the lower arch — simple stainless steel clasps have been used for additional retention, (b) Unnecessary gingival coverage is easily avoided in the upper arch. Cast clasps have been added for more effective support and retention, (c) Wrought stainless steel rests

前就完成义齿的制作，拔牙后马上戴上，因此，称为即刻可摘局部义齿（图7-3）。这种义齿通常在拔牙后3~6个月，牙槽嵴形状稳定后被最终的可摘

tainer during the initial period of rapid bone resorption and remodelling. It is usual to complete construction of the denture before tooth extraction and fit it immediately af-

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图 7-3 a. 无保留价值的下颌切牙；b. 用简单的丙烯酸树脂下颌可摘局部义齿做即刻修复，所有上颌牙用即刻全口义齿来恢复

Fig 7-3 (a) Lower incisors with hopeless prognosis, (b) Use of a simple acrylic lower partial denture as their immediate replacement. All remaining upper teeth were replaced with a complete immediate denture

局部义齿或固定义齿所取代。在这个时候即刻义齿采用铸造金属支架是不明智的，因为它不可能在口内试戴，如果不合适的话，就会陷入令人尴尬的局面。

ter extractions are completed - hence the term immediate partial denture (Fig 7-3). This denture will then be replaced with a definitive partial denture or fixed prosthesis when the ridge shape has stabilised, usually three to six months after the teeth have been extracted. It is unwise to construct immediate partial dentures with cast metal frameworks as it is often not possible to try the framework in the mouth before completion with embarrassing consequences if it does not fit.

被拖延的修复治疗

缺失牙的最终修复应该在余留牙完成充填、牙周状态得到改善并且稳定以后进行，这通常是个长期的过程。在此期间，可能因为美观和功能的原因需要部分义齿修复（图 7-4）。另外，牙周治疗，特别是当同时兼有外科治

Prolonged restorative treatment

The definitive replacement for missing teeth should not be constructed until the restorative and periodontal status of the remaining teeth has been corrected and stabilised. Such treatment is frequently prolonged and partial dentures may be required

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图7-4 在牙周治疗和后牙修复期间，使用过渡性上颌可摘局部义齿来维持美观和𬌗关系

Fig 7-4 A transitional upper partial denture used to maintain appearance and occlusion during treatment to address the periodontal condition and restoration of posterior teeth

疗时，常导致支持软组织形态明显改变，此时可以采用过渡性的丙烯酸树脂局部义齿进行修复，待牙周治疗成功完成和软组织稳定后，再使用最终的修复体。

过渡性可摘局部义齿常用于治疗严重的牙体磨耗同时伴有𬌗面高度丧失的患者(图 7-5)，目的是在永久性的冠、固定或活动修复治疗之前和治疗期间，暂时修复缺失牙，并在一个适当的𬌗面高度上建立一个稳定的𬌗关系。通常没有必要将过渡性可摘局部义齿仅仅用于确定增加的𬌗面高度是否可以接受，因为大多数缺牙患者都乐意接受为获得满意外观而增加的𬌗面高度。当不需要修复失牙时，用简单的粘结复合树脂来增加𬌗面高度更好(图 7-6)。

for aesthetic and possibly functional reasons during provision of this treatment (Fig 7-4). In addition, periodontal treatment, particularly when it involves surgical intervention, frequently results in considerable changes to the shape of the supporting soft tissues. It is usual to construct transitional acrylic partial dentures that will be replaced after the periodontal treatment is successfully completed and the soft tissue shape has stabilised.

The provision of transitional partial dentures is often indicated when treating severe tooth wear and an associated loss of occlusal face height (Fig 7-5). These dentures are used to both replace missing teeth and establish a stable occlusion at an acceptable occlusal face height before and during the provision of permanent crowns, fixed and removable prosthesis. The use of transitional partial dentures to determine solely what increase in occlusal face height is acceptable to a patient is generally un-

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图 7–5 示例用过渡性可摘局部义齿作为过渡治疗来恢复外观和增加殆面高度

Fig 7-5 (a,b) Examples of transitional partial dentures used as an Interim treatment to restore appearance and increase face height



图7-6 用简单的黏结树脂来恢复外观和殆面高度，而不是采用过渡性可摘局部义齿（感谢 R. Tones 先生）

Fig 7-6 Use of simple adhesive composite restorations to restore appearance and occlusal face height without recourse to a partial denture. (Courtesy of Mr R. Tones.)

necessary since the very large majority of partially dentate patients will readily accept the increase in face height needed to restore a satisfactory appearance. When transi-

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tional partial dentures are not required to replace missing teeth, the use of simple adhesive composite restorations to effect the initial increase in face height is preferred (Fig 7-6).

年　龄

对于年轻的局部缺牙患者，在生长发育期间不适宜使用永久修复体，就需要采用一系列的过渡性可摘局部义齿。对于牙齿发育不完全的儿童，其永久修复常常被推迟到恒牙萌出和所有必需的正畸治疗完成以后。当计划采用种植支持式义齿来永久修复先天缺失牙时，种植体要等到患者生长发育停止时才能放置。在此期间，可以采用过渡性可摘局部义齿来满足美观和功能的需要。对于严重的牙发育不全患者，通常是这样。仅仅采用简单的黏膜支持和覆盖可摘局部义齿来恢复缺失牙和殆面高度，就能有效地提高外观和功能（图7-7）。这样的义齿还能作为正畸治疗完成后的间隙保持器。当患者进一步发育和牙萌出时，采用全丙烯酸树脂制作义齿，方便义齿的调改和替换，不过这样可能存在义齿折断和磨损的风险。对大多数病例，可以仅使用一个上颌可摘局部义齿来恢复足够的外观和功能，从而可以避免不必要的组织损伤，患者也易于接受。

Age

In young partially dentate patients it may not be feasible to provide a permanent restoration during the growing period and as a consequence a series of transitional dentures may be required. In children with hypodontia, the definitive replacement of missing teeth is frequently delayed until the eruption of permanent teeth and any necessary orthodontic tooth movement has been completed. When the planned definitive restoration of congen-itally absent teeth is an implant-supported prosthesis, implant placement will not usually commence until growth has ceased. In the interim, there may be aesthetic and functional demands that can be met by the provision of transitional partial dentures. This is commonly the case for patients with severe hypodontia in whom the use of simple mucosal borne and overlay partial dentures to replace teeth and restore occlusal face height can effect a considerable improvement in appearance and function (Fig 7-7). Such prosthesis may also act as space maintainers following completion of active orthodontic treatment. When further growth and tooth eruption is

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图 7-7　对严重牙齿发育不完全的患儿采用过渡性可摘局部义齿修复的示例

Fig 7-7　(a,b) Examples of the use of transitional partial dentures in dhildren with severe hypodontia

anticipated, the denture will normally be all-acrylic to allow for easy adjustment and replacement, although denture fracture and loss is a potential disadvantage. In the majority of cases, sufficient improvement in both appearance and function can be made through the provision of an upper denture only. This facilitates the use of a design that will avoid unnecessary tissue damage and improve acceptance.

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常见的暂时性义齿样例

匙状义齿

当前牙缺失时，这是一种暂时性的行之有效的方法（图7-8）。匙状义齿依赖于附着力和黏附力固位，需要一个唇基托来防止在𬌗负荷下义齿向腭侧移位和旋转。这种设计的优点在于不覆盖牙龈，但它并不是很稳定，固位不好，只能起到美观作用。

带金属支托和卡环的暂时性可摘局部义齿

当需要延长义齿的使用期时，我们希望通过使用锻造或铸造支托和卡环来获得额外的支持和固位（图7-2b）。实际上，铸造卡环装置比铸造合金支架有更多优点。这样的设计特别适于上颌牙弓需要延长义齿的使用期时，常常是紧随在广泛的牙周治疗以后。

Examples of Commonly Used Transitional Dentures

Spoon denture

This is a useful temporary expedient when an anterior tooth is lost (Fig 7-8). The spoon denture relies on the forces of adhesion and cohesion for retention and requires a labial flange to prevent displacement palatally and rotation under occlusal loading. This design has the advantage of not covering the gingiva but it is not very stable or retentive and is of aesthetic value only.

Transitional partial denture with metal rests and clasps

The additional support and retention gained by the use or wrought or cast rests and clasps is desirable when prolonged use of the denture is anticipated (see Fig 7-2b). Indeed, cast clasp assemblies confer many of the functional benefits associated with cast alloy frameworks. Such a design is



图7-8 用匙状义齿来恢复2|，后牙使用变形箭头卡来增加固位

Fig 7-8 A spoon denture replacing UR2. Additional retention can be gained with Adam's cribs on posterior teeth

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如果将来需要拔除牙齿，人工牙也能简单地添加在丙烯酸树脂大连接体上。

particularly useful in the upper arch where a prolonged period of use is envisaged. This is frequently the case following extensive periodontal treatment. Should future extractions be required, replacement teeth can be simply added to the acrylic major connector.

Every 义齿

这是一种简单的、全丙烯酸树脂的上颌可摘局部义齿，可以被用于伴前牙缺失的后牙有界限鞍基义齿（图 7-9），不适用于游离端鞍基或下颌义齿。这个设计最初由Every在1949年提出，旨在克服施加在余留牙上的潜在的破坏作用，特别是侧方力。设计要点包括：

- 邻牙和人工牙之间呈点接触
- 保持腭侧龈边缘的间隙，呈开放

The Every denture

This is a simple, all-acrylic upper partial denture that may be used for bounded saddles with anterior modification spaces (Fig 7-9). It is not applicable to free-end saddles or lower partial-dentures. The design was originally proposed by Every in 1949 in an attempt to overcome what was considered to be potentially destructive effects of, in particular, lateral loads on the remaining teeth. Design features of importance include:

- point contact between adjacent standing and artificial teeth
- clearance of the gingival margin pala-

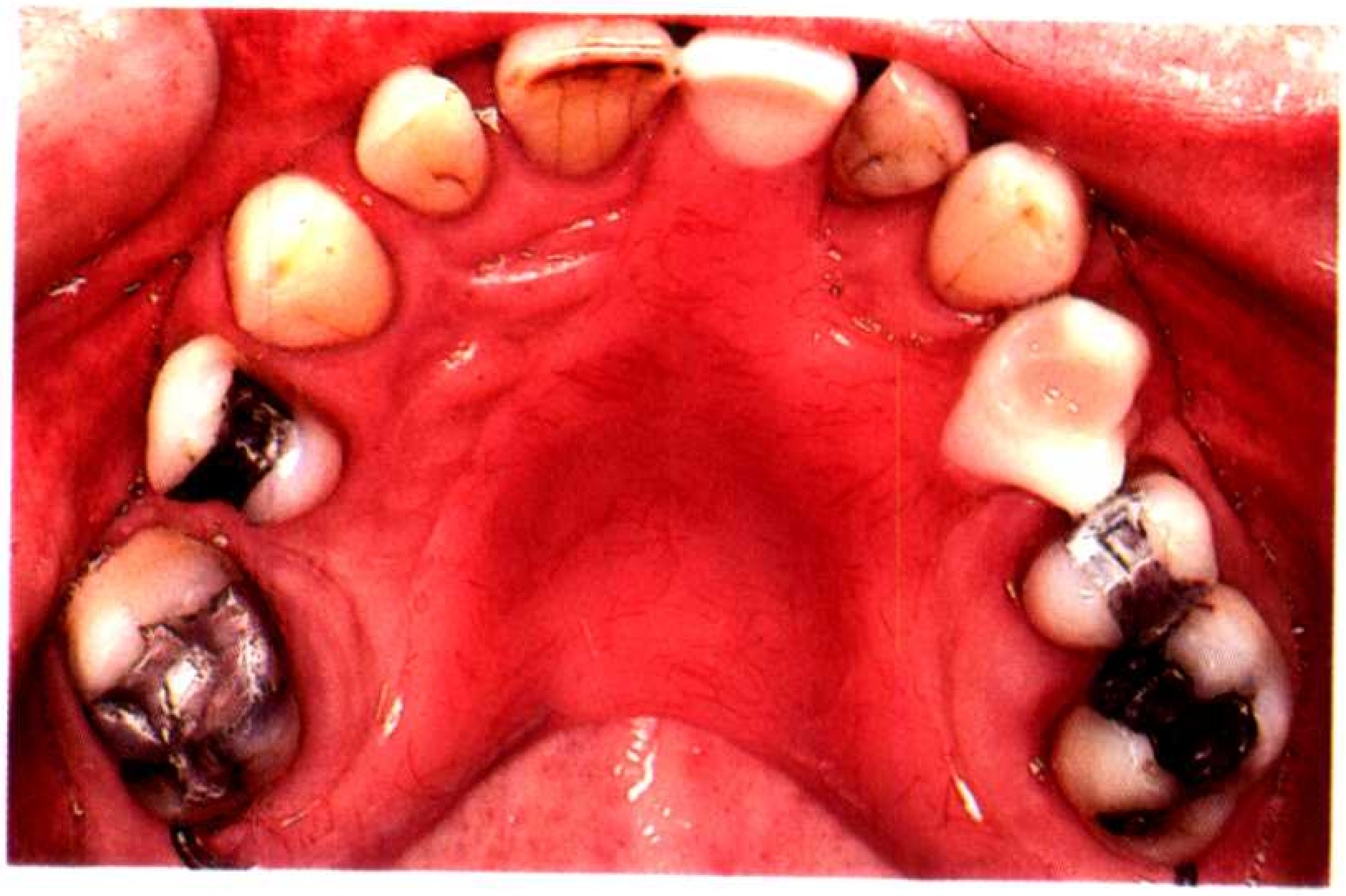


图 7-9 Every 义齿展示龈边缘留出间隙，呈开放性鞍基－桥基牙关系和不锈钢丝与最后磨牙远中面点接触

Fig 7-9 The Every denture demonstrating clearance of the gingival margin, open saddle – abutment relationship and stainless steel arms making point contact on the distal surfaces of the last standing molar teeth

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性鞍基－桥基牙关系

- 唇颊侧基托增加环抱作用
- 义齿与最末端牙齿的远中面接触以防止远中移位和维持鞍基的近远中宽度，这个接触常通过不锈钢丝获得。由于唇侧基托和最后磨牙远中面之间互有倒凹，这种接触有利于增加固位

保持龈缘的间隙使得这种设计特别有用，尤其适合于正在进行广泛牙周治疗，但需要对缺失前牙进行修复的患者。

过渡到无牙颌

从业医师有时会面临为某些患者制定治疗计划的问题，这些患者往往任其口腔疾病发展，直至需要拔除许多牙的严重阶段。在这些病例中，保留余留牙来为可摘局部义齿提供长期的支持是不可能。这样的患者最终将成为无牙颌患者，必须佩戴全口义齿。全口义齿不能完全替代天然牙，特别是长期使用时存在美观和功能限制。因此让患者成为无牙颌是最后迫不得已的决定，必须基于对患者口腔情况和患者期望值的仔细评估。评估应该分

tally and an open saddle-abutment relationship

- labial and buccal flanges to assist bracing
- contact of the denture with the distal surface of the most posterior tooth to prevent distal drift and maintain the mesiodistal width of the saddle. This contact is normally achieved using stainless steel wire and has the additional benefit of augmenting retention as the labial flange and the distal surface of the last molar are often undercut with respect to each other.

Clearance of the gingival margin makes this design useful, in particular, for those patients undergoing extensive periodontal therapy but who require replacement of missing anterior teeth.

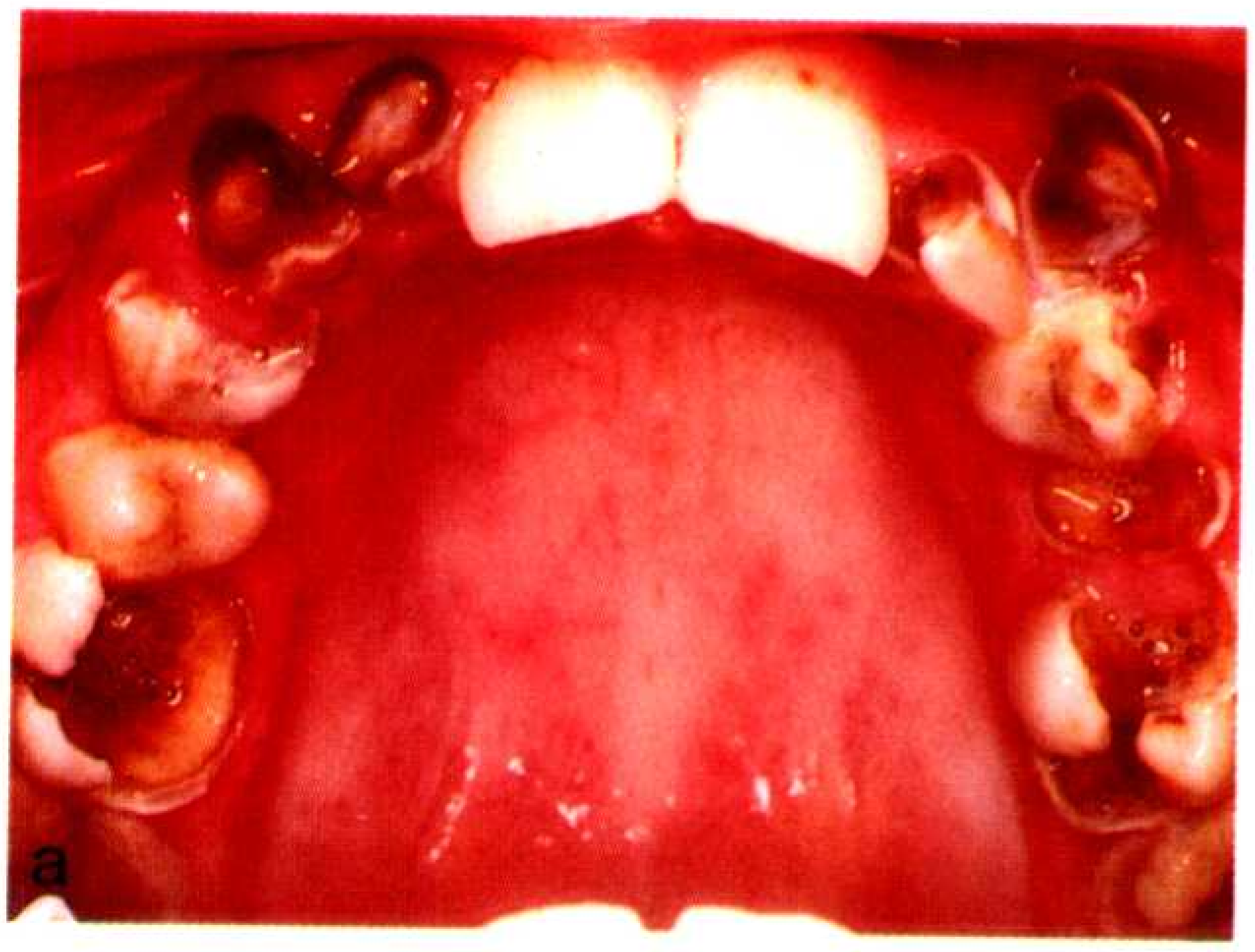
The Transition to Edentulousness

The dental practitioner is sometimes faced with the problems of formulating treatment plans for patients who have allowed dental disease to progress to such advanced stages that multiple extractions are indicated. In some of these cases, it may become impossible or impractical to retain natural teeth to provide long-term support of partial dentures. Such patients will ultimately become edentulous and must face the prospect of wearing complete dentures. Complete dentures are not an adequate sub-

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辨出哪些牙可以在过渡到使用全口义齿期间成为覆盖桥基牙（图 7-10）。覆盖桥基牙常常是尖牙，特别是对于下颌牙弓而言，使用全口覆盖义齿比传统的全口义齿有更重要的功能优势。的确，通过治疗来保留潜在的覆盖义齿桥基牙应该成为整个治疗计划中的重要部分，从而方便患者过渡到使用全口义齿。

stitute for natural teeth and there are, in particular, aesthetic and functional limitations associated with their long-term use. The decision to render a patient edentulous is therefore one of last resort and must be based upon a careful evaluation of the mouth and the patient's expectations. This assessment should identify teeth that may usefully serve as overdenture abutments when the transition to complete dentures is made (Fig 7-10). This may often be the case for canine teeth and is of particular importance in the lower arch where the use of complete overdentures offers important functional advantages over conventional complete dentures. Indeed, treatment aimed



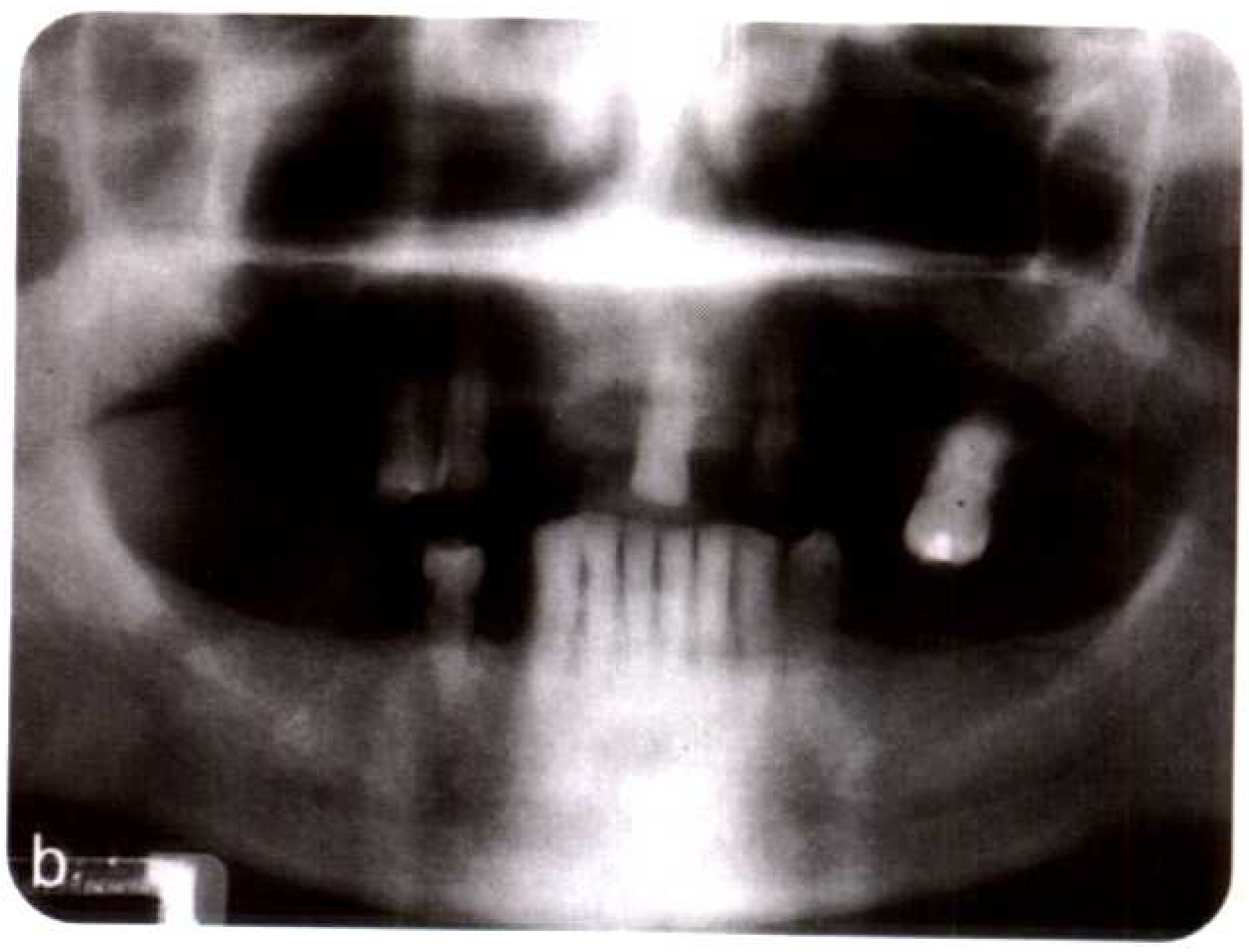


图 7-10　a. 广泛的龋齿暗示大多数余留牙不能被修复，需要拔除，很少的牙齿会余留下来支持最终的可摘局部义齿，在这种情况下，使用过渡性可摘局部义齿可以方便患者向无牙颌的过渡；b. 虽然大多数余留牙的预后较差，但上颌尖牙有可能作为覆盖义齿的桥基牙，这会大大提高上颌全口义齿的功能

Fig 7-10 (a) Extensive caries suggests that most remaining teeth are not restorable and require extraction. Too few teeth will remain to support a definitive partial denture and the use of a transitional partial denture to ease the transition to the eventual loss of all teeth is indicated. (b) Although the prognosis for the majority or remaining upper teeth is hopeless, UR3 and UL3 could be potential overdenture abutments that will greatly improve the function of an upper-complete denture

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to retain such teeth as potential overdenture abutments should form an essential part of the overall treatment strategy to facilitate the transition to complete denture use.

还有一些计划过渡到无牙颌的临床情况见图 7-11。在许多病例中，余留牙的数目和状态就可以使我们做出决定，但情况并非总是如此，余留牙的分布情况和对颌牙的状态也是一个重要因素。患者的全身健康情况也会进一步地影响治疗计划。例如，患者健康状况的恶化要求早期拔除预后不确定的牙，因为晚拔牙可能是有害的。以及在放射治疗之前（如恶性肿瘤），拔除放射区内预后差的牙齿。

Further examples of clinical situations where a planned transition to edentulousness may be indicated are illustrated in Fig 7-11. In many cases, the number and status of the remaining teeth make the decision clear cut but this is not always the case and the distribution of the remaining teeth and the status of the opposing arch can be important factors. The general health of the patient can be a further influence. For example, the likelihood of deterioration in a patient's health may dictate the early extraction of teeth of dubious prognosis as later extractions may prove hazardous. The removal of teeth of poor prognosis before radiation therapy (for malignancy) may be indicated where the mouth is within the target field.

训练局部义齿

以前，转变到无牙颌是一个突然的过程，往往是拔除大量牙齿，然后戴上全口即刻义齿。而现在这个过程得到了根本改变——从一次大量拔除转变成单个牙逐渐拔除，并缓慢地过渡到无牙颌。这个过程通常受到过渡性义齿的影响。这些简单的、丙烯酸树脂制成的黏膜支持式义齿是专门为从过渡性义齿转化为全口义齿而设计的。

Trainer partial dentures

Formerly, the transition to edentulousness tended to be an abrupt process typically involving the extraction of numerous teeth and the provision of complete immediate dentures. More recently, this process of total tooth loss has radically altered with a move away from the removal of large numbers of teeth to one of the gradual loss of teeth and a more gentle tran-

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图 7-11　为无牙颌制定计划。a. 余留牙的数目和状态不能支持一个永久性的可摘局部义齿；b. 余留牙过度萌出，牙槽嵴向下生长和某些部位咬合过紧导致无法使用永久性可摘局部义齿，对于过度伸长的牙需要拔除，下颌用尖牙做桥基牙进行全口覆盖义齿修复，上颌最好选择过渡性可摘局部义齿；c. 虽然下颌余留牙的固位力足够，但对颌为全口义齿，较弱的剩余牙槽嵴支持力可能导致上颌义齿不稳定，在这种情况下，选择下颌全口覆盖义齿比可摘局部义齿更好

Fig 7-11　Planning for the eventual loss of all teeth, (a) The number and status of remaining teeth will not support a definitive partial denture, (b) The combination of overeruption, alveolar down growth and some over closure prevents the construction of functional definitive partial dentures. The severely over-erupted teeth will require extraction and a lower complete overdenture using LR3 and LL3 as abutments and a transitional upper partial denture may be the best option, (c) Although retention of the remaining lower teeth is possible, the arch is opposed by a complete upper denture that is inherently unstable because of the poor support potential of the residual upper edentulous ridge. In this case, a complete lower overdenture may be a more functional option than a partial denture

提供这样义齿的一个重要目的是在所有牙齿缺失之前，赋予患者学习义齿取戴技术的机会。因此，这种义齿被称为“训练义齿”。

sition to edentulousness. This process of transition is normally effected by simple, acrylic mucosal borne transitional partial dentures that are specifically designed for later conversion into complete dentures. An important objective of providing such dentures is to give the patient an opportunity

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to develop denture wearing skills before all the remaining teeth are lost – hence, the term "trainer dentures".

治疗的整个过程取决于每个人的具体情况，但第一步常常是拔除全部或者大部分需要拔除的后牙。几个月后，当后牙牙槽嵴达到一个相对稳定的状态时，制作过渡性义齿。在佩戴这些义齿一段时间以后，再从这一阶段转变到全口义齿（图7-12）。更多的时候是连续将人工牙添加到义齿上，直到义齿将牙齿完全拔除后留出的间隙填满。这种方法对患者的创伤性小，许多患者会发现那些看起来无希望的牙齿竟然长时间地保留功能，推迟了最后使用全口义齿的时间。

The exact procedure will depend upon individual circumstances but often the first stage involves extraction of all or most of the posterior teeth that need to be removed. After a period of up to several months, when the posterior alveolar ridges have reached a relatively stable condition, the transitional dentures are constructed. After wearing these dentures for a limited period they may then be converted in one stage into complete dentures (Fig 7-12). More usually, successive additions of teeth are made to the dentures until the dental clearance is complete with teeth extracted as and when the need arises. This approach is generally less traumatic for patients many of whom can derive significant function from seemingly hopeless teeth for surprisingly long periods of time, delaying the eventual use of complete dentures.

为了完成义齿上人工牙的即刻添加，要将义齿戴在口内取印模。灌注模型时，义齿就留在印模内，然后将模型从印模材料中取出，逐个切断需要修复的牙齿。每个切断的余留牙用人工牙进行修复，占据同样的位置。修整牙龈区域使之类似拔牙后软组织的缺损，用自凝丙烯酸树脂固定人工牙到义齿上，完成基托，最后，拔除牙齿，同时将义齿戴入。使用过渡性局部义齿辅

To make immediate additions of artificial teeth to a denture, an impression is made of the mouth with the denture *in situ*. The denture is left in the impression during pouring of the cast, and following removal of the impression from the cast, the teeth to be replaced are cut away one by one. Each tooth removed is replaced by an artificial tooth that occupies the same position. After trimming the gingival re-

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助过渡到全口义齿的优缺点见表 7-1。

gions to accommodate any immediate soft tissue collapse after extraction, the artificial teeth are fixed to the denture with self-curing acrylic resin and the flange is completed. Finally the extractions are carried out and the converted dentures are inserted at the same appointment. The advantages and disadvantages of this use of transitional partial dentures to aid the transition to complete dentures are described in Table 7-1.

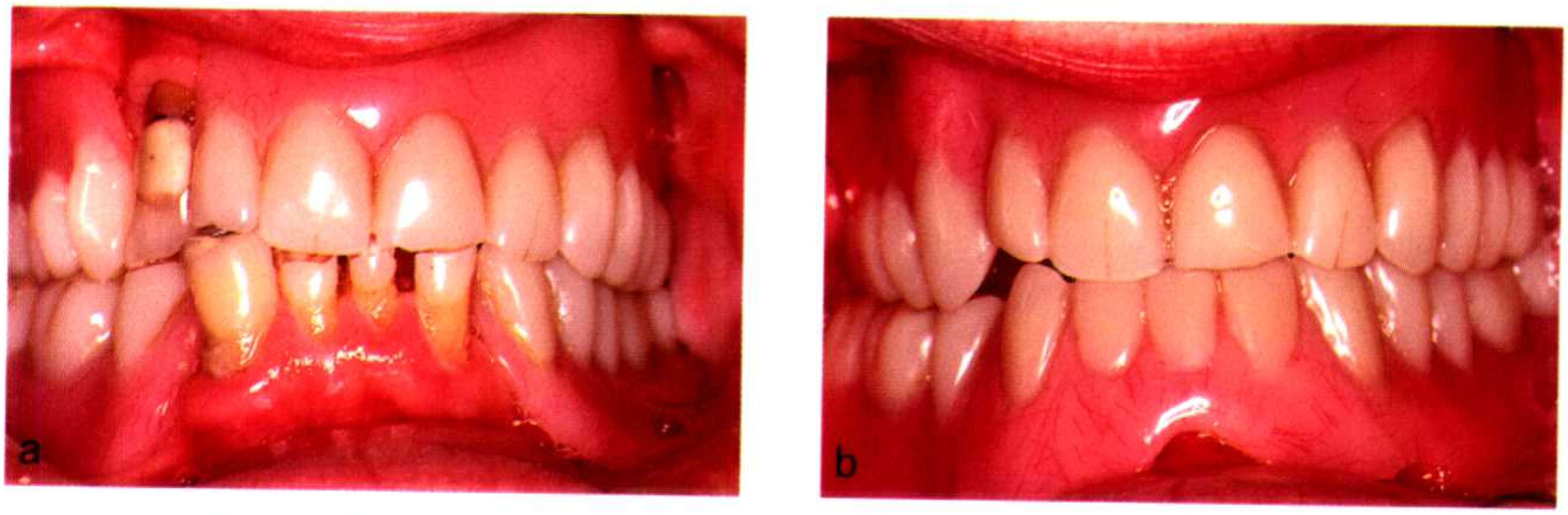


图 7-12　转换：a. 简单的过渡性可摘局部义齿；b. 全口义齿

Fig 7-12　Conversion of (a) simple transitional partial dentures to (b) complete dentures

表 7-1　使用过渡性局部义齿辅助过渡到无牙颌的优缺点

Table 7-1　Advantages and disadvantages of the use of transitional partial dentures to aid the transition to edentulousness

优　点	缺　点
简单、经济	反复添加人工牙可能给患者带来不便
相对无创伤	余留牙可能随时出现问题
维持功能和外观	很难制作一个既美观、功能又好的义齿
能利用余留牙提供的信息（如垂直距离）	余留牙的位置和分布不可接受
患者喜爱	延长治疗时间
预先对义齿进行适应	

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当明确合适的覆盖义齿桥基牙以后，将过渡性义齿最后转变成全口义齿的一部分工作就是添加人工牙。通常在添加人工牙之前要进行必要的牙髓治疗，同时此牙被截短，预备成覆盖义齿桥基（图 7-13）。

When suitable overdenture abutment teeth have been identified, the addition of the overlying replacement denture teeth will be made as a part of the final conversion to complete dentures. Necessary endodontic treatment is usually performed prior to the addition of the artificial tooth to the partial denture at which time the tooth is decoronated and prepared as an over-denture abutment (Fig 7-13).

如果患者已经佩戴了满意的可摘局部义齿，那么可以通过即刻添加人工牙来转变成为全口义齿。但是，患者现存的可摘局部义齿一般很少能够满足这个要求。不过，在常规的全口即刻义齿完成之前，它们还是可以作为暂时修复体来添加任何余留的后牙。

If satisfactory partial dentures are already worn by the patient then it may be possible to convert these into complete dentures by the process of immediate additions. However, existing partial dentures are rarely adequate for this purpose but they may be used as interim prosthesis for the addition of any remaining posterior teeth, until conventional complete immediate replacement dentures are constructed.

重　点

- 作为一种暂时性的修复、维持美观以及殆稳定的手段，过渡性可摘局部义齿有重要的作用。
- 其适应证包括作为即刻可摘局部义齿，在延期的修复治疗期间作为暂时修复体，以及会有进一步发育和牙齿萌出的年轻患者。

Key Points

- Transitional partial dentures serve an important role as an interim means of restoring and maintaining appearance and occlusal stability.
- Indications include their use as immediate replacement partial dentures, as interim prosthesis during prolonged restorative treatment and in young patients in whom further growth and tooth eruption will occur.

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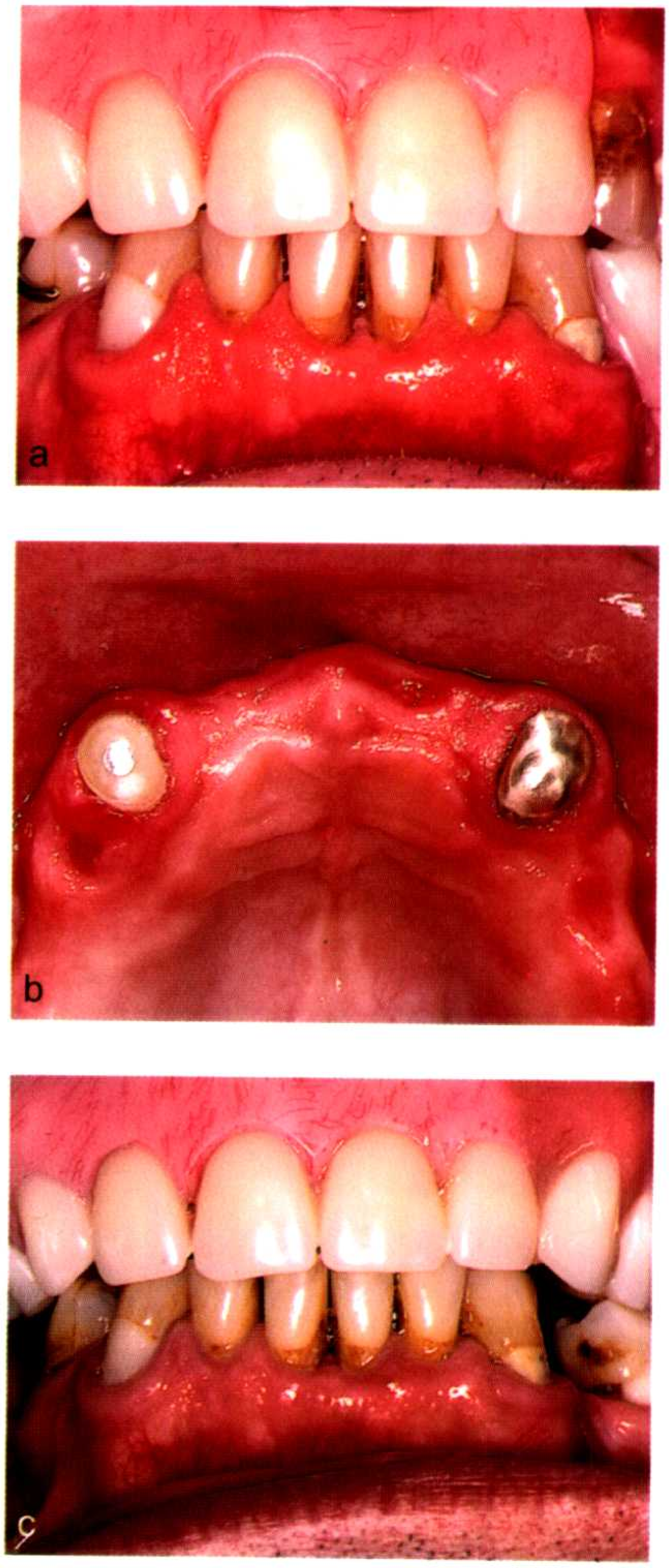


图 7-13 连续显示过渡性可摘局部义齿向全口义齿的转变：a. 取印模前放置过渡性义齿在口中，在义齿上添加⌊34；b. ⌊4已经拔除，⌊3被预备成覆盖义齿桥基牙；c. 即刻戴入修补后的义齿

Fig 7-13 Series showing the final conversion of a transitional partial denture to a complete overdenture: (a) transitional denture in place prior to an impression of the denture *in situ* and the addition of UL3 and UL4 to the denture; (b) UL4 has been extracted and UL3 prepared as an overdenture abutment; (c) the immediate insertion of the modified denture

- 简单的训练可摘局部义齿有助于患者逐步过渡到无牙颌。

- Simple trainer partial dentures have a significant role in the gradual transition to edentulousness.

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第8章 临床指导Ⅰ：收集信息

Clinical Guide I: Gathering the Information

目 的

本章阐明了对部分缺牙患者进行评价和制定治疗计划的过程，描述了制作咬合关系研究模型的临床步骤，解释了修复前牙时进行诊断性试排牙的优点。

Aim

This chapter considers the process of assessment and treatment planning for partially dentate patients. The clinical stages used to produce articulated study casts are described and the advantages of a diagnostic anterior set-up when anterior teeth are to be replaced are explained.

要 点

阅读本章后，从业医师应该意识到在开始修复之前，需要对部分缺牙患者进行彻底的评估，应该知道制作咬合关系研究模型的临床步骤以及在制作义齿支架前进行前牙试排牙的必要性。

Outcome

After reading this chapter, the practitioner should be aware of the need for a thorough process of assessment and evaluation before embarking on treatment to replace teeth in partially dentate patients. The practitioner should be aware of the clinical procedures to produce articulated study casts and appreciate the need for an anterior try-in before the denture framework is made.

引 言

本章和接下来的几章概述了可摘局部义齿制作的各个临床步骤，其内容基于缺牙患者采用金属支架可摘局部义齿进行修复。每一步都是从临床

Introduction

This and the subsequent chapters outline the clinical stages involved in the provision of partial dentures and is written from the perspective that a partial denture with a

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目的、技术和材料要求以及最常见的临床错误等几个方面来进行描述。完成简单的一个步骤可能需要多次临床预约。

metal framework is the likely treatment option for the restoration of a partially dentate patient. Each stage is described in terms of its clinical objectives and the techniques and materials required together with a discussion of the most common clinical errors. Completion of a single stage may require more than one clinical appointment.

检查和初印模

本步骤的目的：

- 完成一个初步的评估
- 取初印模（研究模型）
- 在恢复前牙缺失时选择合适的颜色和形态
- 进行其他必要的辅助检查（放射线和桥基牙牙髓活力测试）

Examination and Preliminary Impressions

The objectives of this stage are to:

- complete an initial evaluation
- make preliminary (study cast) impressions
- select an appropriate shade and mould when replacing missing anterior teeth
- carry out or arrange any necessary investigations (e.g. additional radiographs and vitality tests of potential abutment teeth).

初始评估

初始评估的目的：诊断任何存在的病变；明确牙体缺损造成的变化（包括面型的破坏、咀嚼功能的削弱和𬌗稳定的丧失）；评价现存修复体的适合性。初始评估的基础是认真而完全的病史询问和检查。虽然与全牙列的检查没有什么特别不同，但也有与局部缺牙相关的特定方面。为了方便起见，分述如下。

Initial evaluation

The aims of the initial evaluation are: to diagnose any existing pathology; to identify changes that have occurred as a result of tooth loss (such changes would include poor appearance, impaired masticatory function and loss of occlusal stability); and to assess the adequacy of any existing prosthesis. The basis of this initial evaluation will be a careful and thorough case history and examination. Whilst this approach

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does not differ in any particular way from that for the fully dentate patient, there are certain aspects which are of relevance to partially dentate patients. For convenience these are considered under the headings of case history and examination.

病　史

不满意的外观和咀嚼功能的丧失常常是部分缺牙患者的主诉内容。需要通过进一步的询问来清楚了解这样主诉的本质和程度，要明确缺牙的病史和牙缺失后制作的所有修复体的情况。通常导致牙齿缺失的原因是龋坏、牙周病和外伤，必须了解患者对所有现存义齿的评价，而且要知道不满意的原因。

Case history

Complaints relating to poor appearance and loss of masticatory function are frequently made by partially dentate patients. The exact nature and extent of such complaints must be clearly established by further questioning. The past history of tooth loss and any prosthesis constructed subsequent to tooth loss must be identified. The usual causes of tooth loss are caries, periodontal disease and trauma. The patient's evaluation of any existing prosthesis must be sought and the reasons for any dissatisfaction determined.

检　查

检查必须包括余留牙的牙周、龋坏和牙髓状态，现存义齿的适合性，以及软组织存在的病理变化。考虑到将来可能的义齿修复，应特别注意以下几点：

- 缺牙区的牙槽嵴：包括吸收的量，支持软组织的健康情况和坚实度，注意过高的系带附着、骨

Examination

The examination must establish the periodontal, caries and pulpal status of the remaining natural teeth, the adequacy of existing restorations and identify existing soft tissue pathology. With regard to possible future provision of prosthesis, particular note should be made of the following:

- The edentulous ridges – Features such as the amount of resorption, the health and consistency of the supporting soft

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隆突以及不利的骨性倒凹（图8-1）。

tissue, prominent fraenal attachments and the presence of bony exostoses and unfavourable bony undercuts should be noted (Fig 8-1).

- 殆稳定性的丧失：通过牙齿的倾斜、扭转、移位和过度萌出进行评价；检查在牙尖交错位、后退位、侧方殆和前伸殆时牙齿接触的数目和形态（图 8-2）。

- Loss of occlusal stability – This can be assessed by the identification of tilting, rotation, drifting and overeruption of teeth, and the examination of the number and pattern of tooth con-

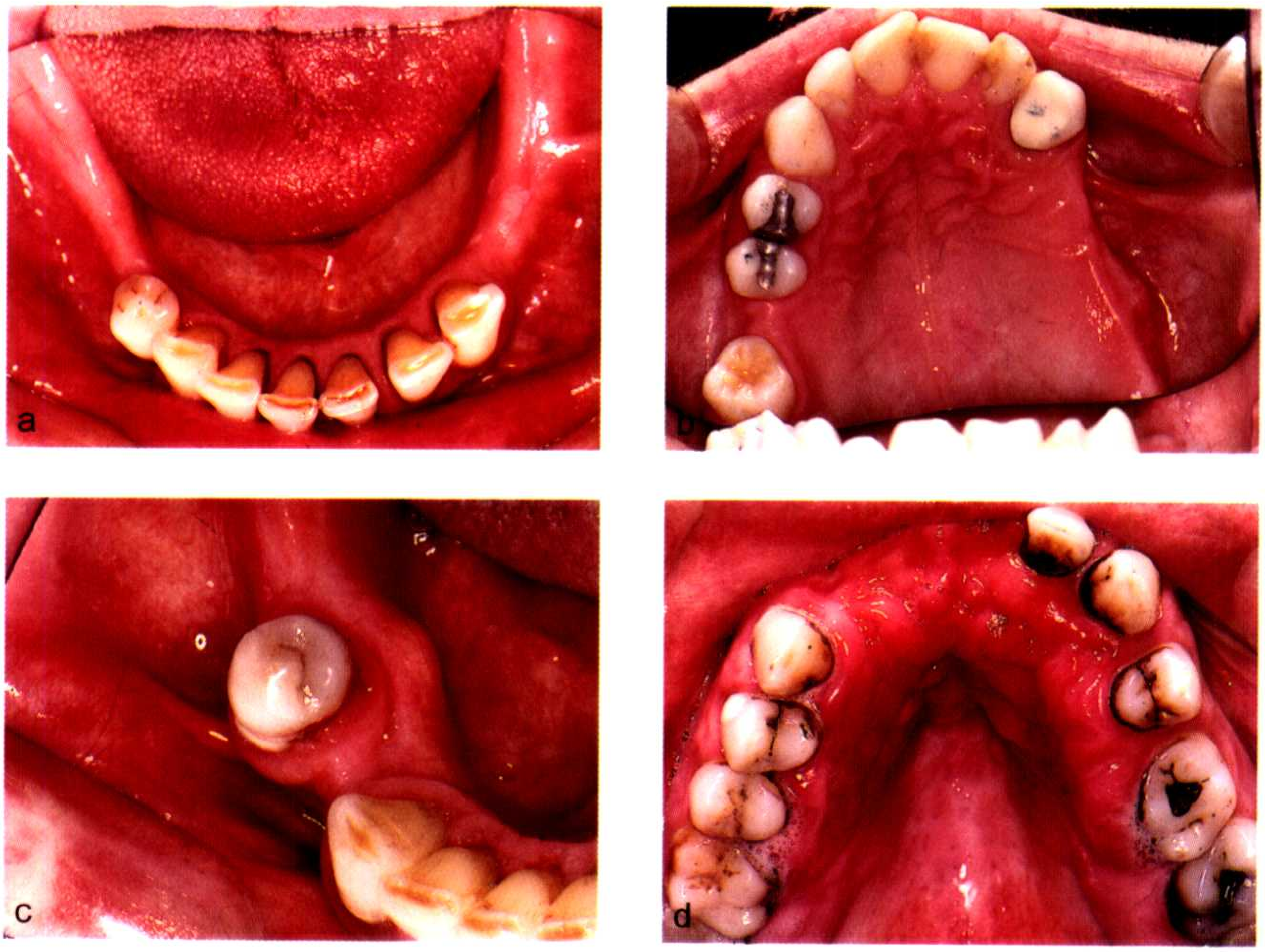


图 8-1　缺牙牙槽嵴的检查。a. 形状良好、坚硬的下颌缺牙牙槽嵴；b. 中度到重度吸收的缺牙牙槽嵴，显示突出的颊系带；c. 孤立第一前磨牙的舌侧骨隆突和突出的颊系带；d. 义齿性口炎，局限在上颌可摘局部义齿腭侧覆盖区域的变红和轻微的乳头状改变

Fig 8-1 Exammation of the edentulous ridges, (a) Well formedand firm lower edentulous ridges, (b) Moderate to severe resorption of the edentulous ridge - note the presence of the prominent buccal fraenum. (c) Lingual bony exostoses and prominent buccal fraenum m relationship to the single standing premolar (d) Denture-induced stomatitis with reddening and slight papillomatous changes confined to the region of palatal coverage by an upper partial denture

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图8-2 殆稳定性。a. 不稳定的牙尖关系：由于下颌后牙的丧失以及牙周问题，导致无咬合后牙的过度萌出，出现前牙间隙和移位；b. 稳定的殆关系：虽然后牙丧失，但仅有轻微的牙齿移位

Fig 8-2 Occlusal stability. (a) An unstable mtercuspation with overeruption of unopposed posterior teeth and spacing and drifting of anterior teeth related to loss of lower posterior teeth and periodontal involvement. (b) A stable occlusion with only slight evidence of tooth movement despite the loss of posterior teeth

tacts in intercuspal position (ICP), retruded, lateral and protrusive occlusion (Fig 8-2).

- 可以为义齿提供的空间：包括无咬合牙的过度萌出；常见于安氏Ⅱ类错殆，与前牙缺失相关的完全深覆殆；由于磨耗导致的殆面高度降低（图8-3）。

- The space available for a prosthesis — Examples include the overeruption of unopposed teeth; a deep, complete overbite in relation to missing anterior teeth and commonly seen in Class II malocclusions; and the reduced interdental space that often results from tooth wear (Fig 8-3).

- 现存的可摘局部义齿：应该仔细评价义齿在口内和口外的外观、贴合性、固位、稳定和设计的合适性；它可能对余留牙和支持软组织产生的损害（图8-4）。

- The existing partial denture(s) — This should be carefully assessed both in and out of the mouth with regard to appearance, fit, retention and stability, and the adequacy of its design and the possible harm it may be causing to the remaining teeth and supporting soft tissues (Fig 8-4).

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图 8-3　义齿的空间。a,b. 由于后牙丧失和前牙磨耗导致咬合过紧，图 a 中5⏋过度萌出严重影响了义齿可以获得的空间；c. 无咬合的⎿5过度萌出伴有牙槽嵴向下生长，没有明显的咬合过紧；d. 在安氏 II 类 2 分类错䝹中，后牙稳定咬合的丧失凸显了严重的覆䝹，消除了义齿可以获得的空间

Fig 8-3　Space for prosthesis. (a,b) Overclosure as a result of posterior tooth loss and anterior tooth wear, and some overeruption of LR5 in (a) has severely limited the space available for a prosthesis. (c) Overeruption of the unopposed UL5 together with alveolar bone down growth. There is no evidence of significant overclosure. (d) The loss of stable posterior contacts in a Class II division 2 malocclusion has accentuated the severe overbite and eliminated any space for a prosthesis

基于初始诊断和评估，可能需要计划初步的治疗措施来立即缓解症状和控制进行性疾病。在早期阶段，常需要实行一级预防措施（如口腔卫生指导和氟的应用）和二级预防措施（如牙周疾病的非外科性治疗和去除其他菌斑滞留因素，如不良修复体）。这个初级治疗也包括对现有的可摘局部义齿

In the light of this initial diagnosis and evaluation, it may be necessary to plan for some preliminary treatment to provide immediate relief of symptoms and the stabilisation of progressive disease. The initiation of primary preventive measures (e.g. oral hygiene instruction and fluoride application) and secondary prevention

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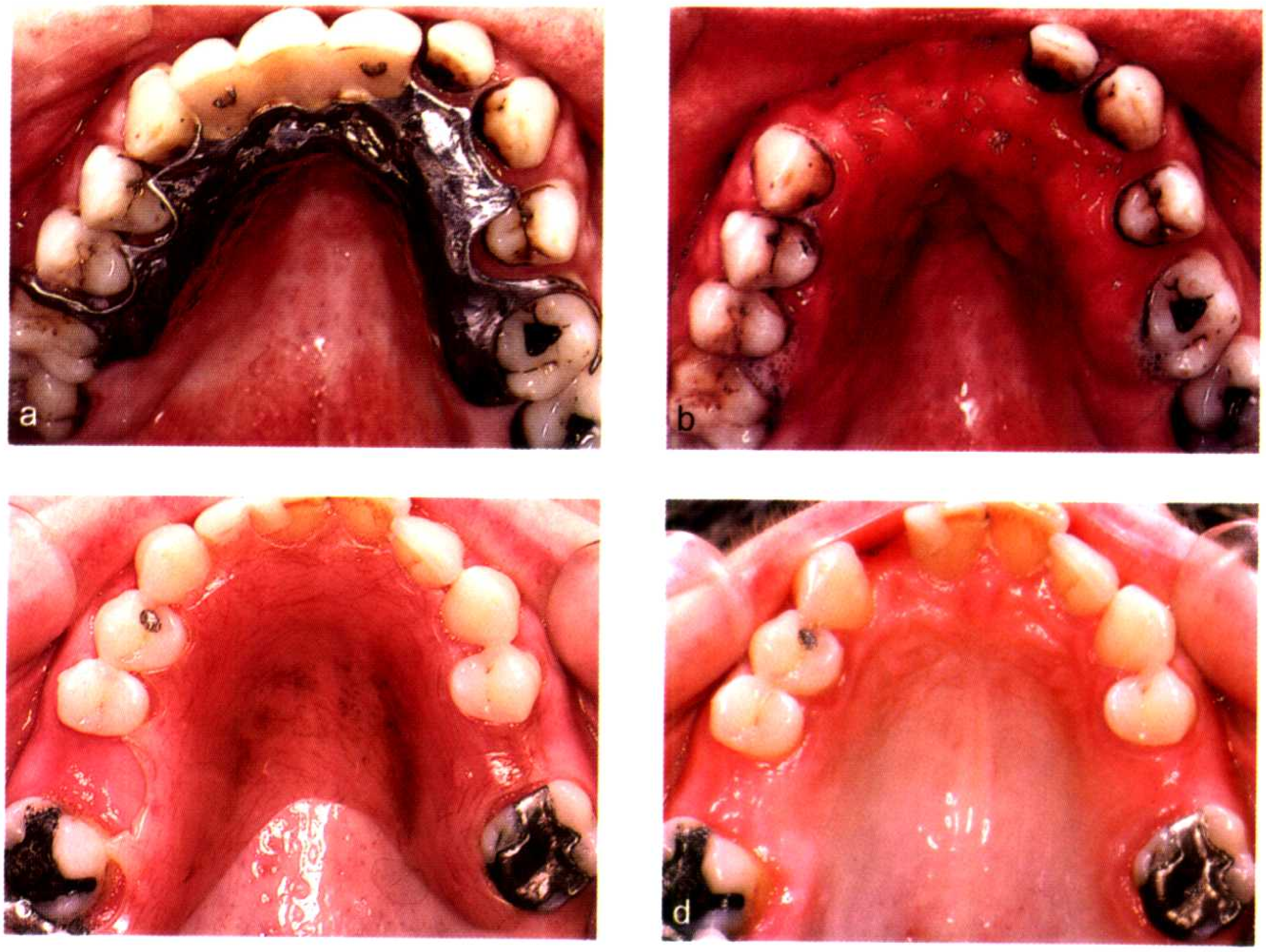


图8-4 现存义齿。a,b. 不贴合、设计差的Co－Cr合金支架可摘局部义齿导致了义齿性口炎和部分牙齿的腭侧脱钙，但这些结果并非不能避免；c,d. 贴合差的丙烯酸树脂上颌可摘局部义齿，有广泛的牙龈覆盖，却没有导致软硬组织的健康恶化

Fig 8-4 Existing dentures. (a,b) An ill-fitting and poorly designed cobalt-chromium partial denture associated with denture-induced stomatitis and palatal decalcifica-tion of several teeth. Such effects are not inevitable. The poorly fitting acrylic upper partial denture with extensive gingival coverage shown in (c) has not been associated with a deterioration of the health of the hard and soft tissues (d)

进行调整，如它们可能对牙齿或软组织造成损害，或需要即刻添加一个或多个人工牙。

(e.g. initiation of non-surgical management of periodontal disease and the removal of other plaque retentive factors such as deficient restorations) may often be required at this early stage. This initial treatment may also involve adjustment of an existing partial denture that may be damaging teeth or soft tissues or require the immediate addition of one or more teeth.

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咬合关系研究模型

咬合关系研究模型是评价局部缺牙患者和制定治疗计划的重要辅助，它有以下作用：

- 提示缺失的软、硬组织
- 观测和设计可摘局部义齿
- 分析𬌗关系
- 提示必要的牙体预备
- 进行前牙试排牙和制作椅旁评价的诊断性蜡型

取（研究模型）初印模

给局部缺牙患者预备有用的初印模是一个挑战，因为它不仅需要精确、细致地记录余留牙，同时还要全部、细致地记录潜在的义齿支撑区域。可以选择藻酸盐作为印模材料，但是除非有延展良好的坚固的成品牙列印模托盘，一般需要修整印模托盘来获得足够的伸展和支持。热塑性的印模膏在这方面是很有用的印模材料，在腭穹窿处，大面积缺牙部位（缺失三颗或更多的牙齿），以及舌侧和颊侧处，如果托盘边缘过短，可以添加印模膏（图8-5）。在任何接近牙齿的地方，印模膏都应该修去至少3mm的空间留给藻酸盐材料。一个细致的印模可以这样获得：先用气枪吹干牙齿，然后，在印模托盘

Articulated study casts

Articulated study casts are an essential adjunct to the evaluation and treatment planning for a partially dentate patient and have the following uses:

- Indication of loss of hard and soft tissues.
- Surveying and design of partial dentures.
- Occlusal analysis.
- Indicate necessary tooth preparations.
- Anterior set-ups and diagnostic wax-ups for assessment at the chair-side.

Preliminary (study cast) impressions

The preparation of useful preliminary impressions of partially dentate patients can be challenging since it combines the requirements for an accurate and detailed record of any remaining teeth together with the need to capture the full extent and detail of the potential denture-bearing area. Alginate is the impression material of choice but, unless this can be supported by well-extended and rigid stock dentate impression trays, modification of the impression tray to achieve an adequate extension and support of the alginate impression material will be required. Thermoplastic impression compound is a useful material in this regard and its addition may often be

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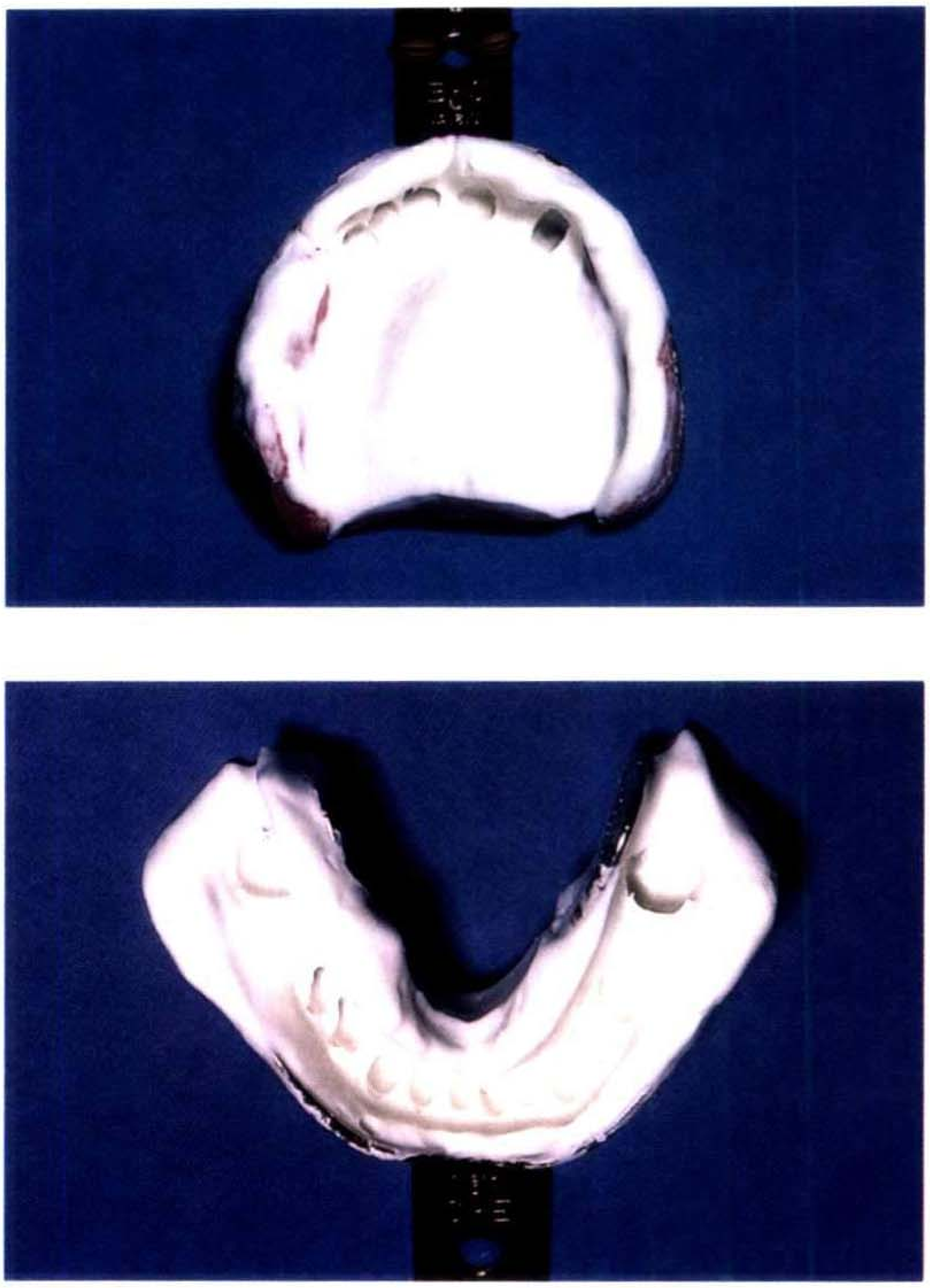


图8-5 上下颌（研究模型）初印模记录了余留牙的细节和完全延伸的义齿承托区。在上颌的大面积缺牙区和腭侧，需要采用印模膏来支持藻酸盐

Fig 8-5 Upper and lower preliminary (study cast) impressions that have recorded the detail of the remaining teeth and the full extent of the potential denture-bearing areas. In the upper, this has required the use of impression compound to support alginate in the large edentulous areas and the palate

就位以前，将少量藻酸盐材料涂抹在𬌗面和外展隙中。

necessary in the vault of the palate, over large edentulous areas (three or more missing teeth) and in lingual and buccal sulci if the tray flange appears short in these areas (Fig 8-5). Any impression compound that flows close to the teeth should be trimmed back to allow a minimum of 3 mm space for the alginate. A detailed impression of the teeth can be ensured by simply drying the teeth with gauze and then wiping a small quantity of alginate into the occlusal fissures and embrasure immediately before seating the loaded impression tray.

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扩展研究

通常需要做附加的研究，包括对所有潜在的桥基牙和预后不佳牙齿做最新的放射线检查。最有用的放射片是曲面断层片（DPT），但在某些不太清楚的区域应该采用口内片进行放大（图 8-6）。对龋坏和充填修复的桥基牙，以及大面积充填治疗，可能涉及义齿设计的牙齿应做活力测试。

有关诊断，或者更通常地说，治疗计划的其他观点也是继续评价的一部分。这些观点常见如，牙周病牙齿的预

Further investigations

Additional investigations will usually be required. These should include up-to-date radiographs of all potential abutment teeth and any other tooth considered to have doubtful prognosis. The most useful radiograph is a dental panoramic tomograph (DPT) but this should be augmented with intraoral views in areas that are not sufficiently detailed by the DPT (Fig 8-6). It is normally wise to perform vitality tests of carious and restored abutment teeth, together with other carious or heavily restored teeth that may be involved in the design of a prosthesis.

Further opinions with respect to diagnosis or, more frequently, treatment planning may form a part of this continuing

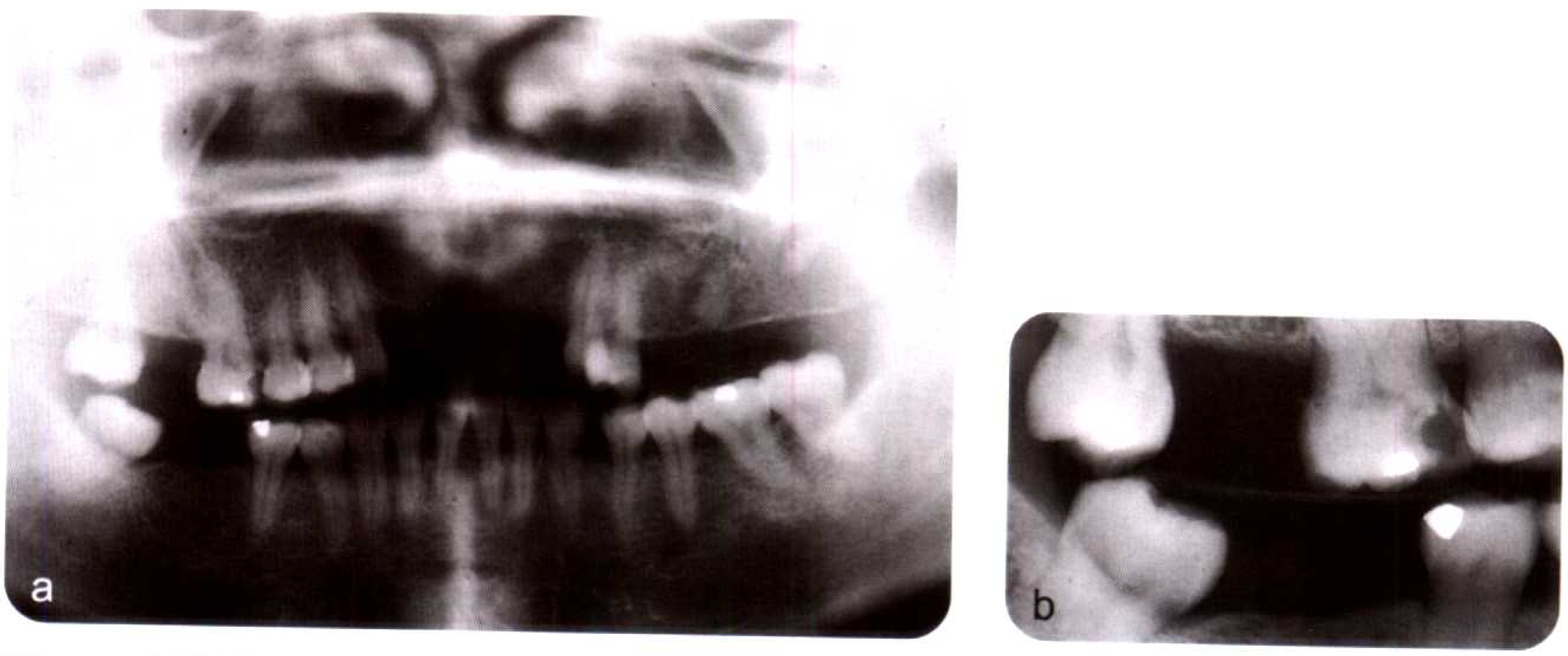


图 8-6　放射线检查。a. 在许多病例中，一张曲面断层片就能够提供充足的口腔细节；b. 但必要时，也需要口内片进行补充

Fig 8-6　Radiographic examination, (a) In many cases, a dental panoramic tomograph alone will provide sufficient detail of the mouth as a whole but should be supplemented by intraoral views (b) as is necessary

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后，选择固定还是活动义齿，如何设计。尽可能多地获得这些信息对于治疗计划是很重要的。

常见错误

- 对现存殆关系不够注意。
- 由于材料不足导致腭部印模不完全，或者更常见的是，由于印模材料过多导致托盘不能完全就位。
- 由于托盘修整不够或者取模时舌头没有抬高、向前，导致舌沟印模记录不全。
- 唇沟记录不全。由于托盘就位时嘴张得太大，嘴唇没有放松和向前抬起，印模材料没有进入唇沟内。

初始颌位记录和义齿设计

这个步骤的目的是：

- 完成一个初始颌位记录（如果需要的话）。

evaluation. Common examples of such opinions may include the prognosis of periodontally involved teeth, and the possibility and design of fixed or removable prosthesis. It is important that as much information as possible is made available to inform the treatment planning.

Common errors

- Insufficient attention paid to the existing occlusion.
- Incomplete impression of the palate due to insufficient material or, much more commonly, a failure to seat the tray completely often as a result of overloading the impression material.
- Poor recording of the lingual sulcus due either to inadequate modification of the tray or because the tongue was not elevated and forward when taking the impression.
- Deficiency in the labial sulcus. The mouth was open too wide when the tray was being seated. The lip was not relaxed and lifted forward to allow impression material to flow into the sulcus.

Preliminary Registration and Denture Design

The objectives of this stage are to:

- complete a preliminary jaw registration (if required)

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• 试戴前牙，根据需要进行修改。

• try in anterior teeth where relevant, and modify as necessary.

初始颌位记录

初始颌位记录对于研究模型对好咬合关系或许有必要。这些颌位记录的性质是不同的（图8-7）。对于大多数

Preliminary registration

A preliminary registration may be necessary to allow articulation of the study casts. The nature of this registration will





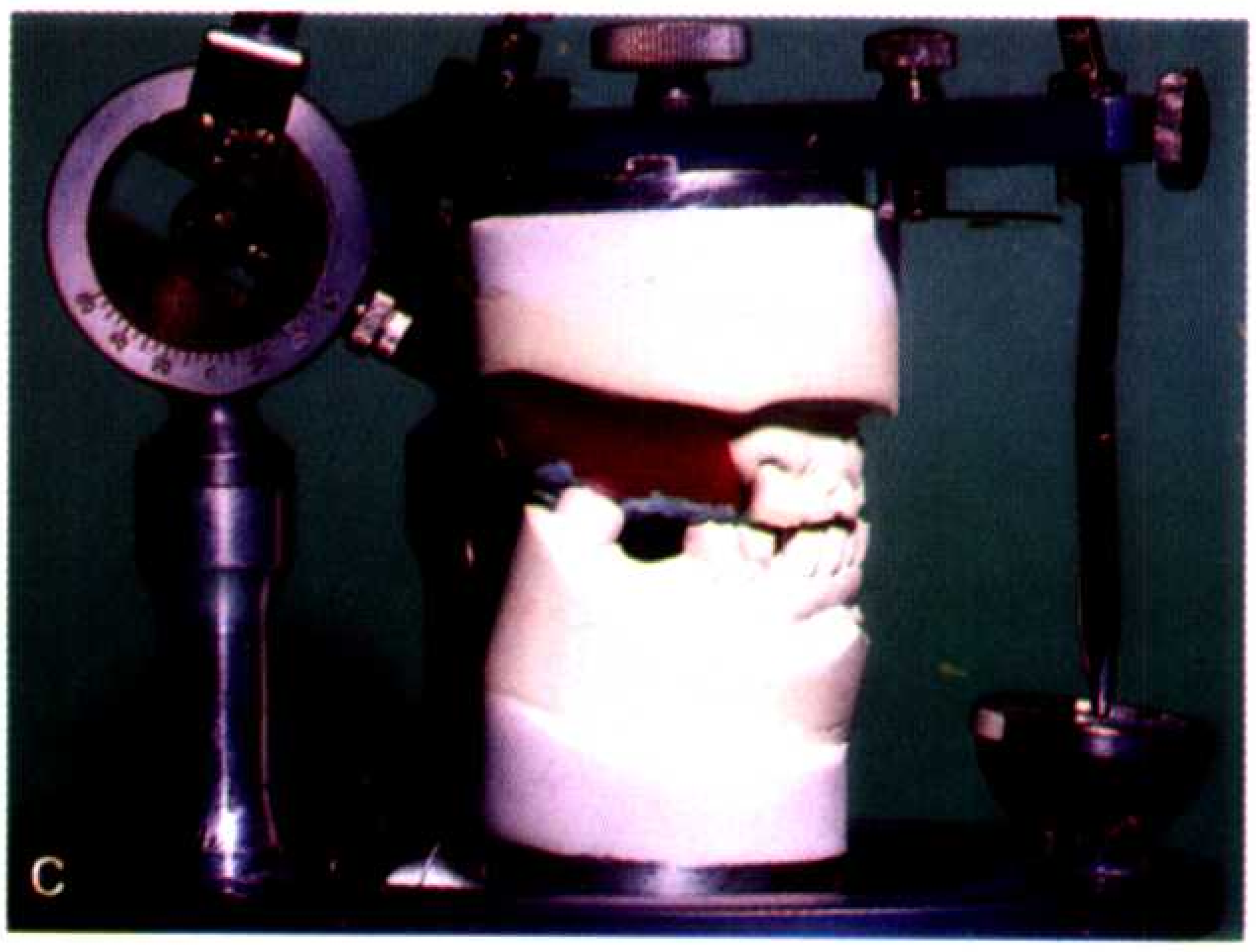


图8-7 初始颌位记录。a. 良好的双侧前、后牙接触允许研究模型咬合在牙尖交错位，而不需要颌位记录；b. 当有更多的牙齿丧失时，用蜡殆堤可以保证稳定地记录牙尖交错位；c. 广泛的后牙缺失和前牙磨耗，利用面弓和后退轴记录将研究模型固定在殆架上，用于评估殆面高度的改变

Fig 8-7 Preliminary registration, (a) Positive bilateral posterior and anterior tooth contacts will allow articulation of study casts in the intercuspal position without the need for a registration record, (b) With more extensive tooth loss an occlusal rim ensures a stable record of the existing intercuspal position, (c) Extensive posterior tooth loss and anterior tooth wear. A facebow and retruded axis record to mount study casts will allow evaluation of the change in occlusal face height needed to restore appearance

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部分缺牙患者来说，颌位关系记录是在现存的牙间交错位上完成的。这种记录最重要的要求是，它应该通过提供一个稳定的牙尖交错位记录，来方便精确地确定研究模型的颌位关系。这可以通过前、后牙区的双侧接触来实现。在缺牙很少的地方，可以简单地用手来对咬合。更常见的是，需要采用蜡䶩堤和其他的记录步骤。然而，必须强调的是，这些仅是提供了记录稳定牙尖交错位的方法，䶩平面的方向和䶩面高度是由天然牙来决定的。

vary (Fig 8-7). For most partially dentate patients, the jaw relationship record is made in the existing intercuspal position. The essential requirement of this registration is that it should facilitate accurate articulation of the study casts by providing a stable record of the intercuspal position. This is achieved by ensuring bilateral contact(s) in the posterior and anterior regions. Where there are few missing teeth it may be possible simply to "hand articulate" the casts. More usually, wax occlusal rims and an additional registration stage is necessary. It should, however, be emphasised that these simply provide the means of obtaining a stable record of the intercuspal position, the orientation of the occlusal plane and the occlusal face height will be dictated by the natural teeth.

当现存的牙尖交错位不适合，和(或)需要做进一步的䶩评估时，后退接触位将作为研究模型上䶩架的下颌参考位。此时，研究模型应该被固定在一个半调节䶩架上，这需要在下颌闭合的后退弧上做早接触记录（后退轴记录）和面弓记录。通常不需要确定息止颌间隙。

Where an existing intercuspal position is considered to be unsuitable and/or when further occlusal assessment is required, then the retruded contact position is used as the mandibular reference position for mounting study casts. In such circumstances study casts should be mounted on a semi-adjustable articulator. This requires the use of a pre-contact registration on the retruded arc of closure of the mandible (a retruded axis record) and a facebow record. Determination of freeway space is not normally required.

由于牙齿磨耗或者缺乏䶩支持，

An assessment of freeway space is rel-

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感觉需要增加殆面高度，就涉及到了对息止颌间隙的评估。息止颌间隙，连同以上提到的颌位关系记录和半调节殆架，可以用来精确评估研究模型在殆面高度上的各种增加。虽然当单颌缺失时也需要确定息止颌间隙和殆面高度，但这通常都留在最后，很少需要做初始颌位记录。

evant where, for reasons of tooth wear or the lack of occlusal stops, it is felt that the occlusal face height should be increased. This, together with the jaw relation record and a semi-adjustable articulator as described above will allow the accurate appraisal of various increases in occlusal face height with the articulated study casts. Although the determination of freeway space and occlusal face height is obviously relevant when one arch is edentulous, this is usually left until the definitive jaw relation record is made, a preliminary registration rarely being required.

前牙试戴

当需要修复前牙时，通常在治疗的早期应该进行前牙试戴。这一过程可以利用初始颌位记录。当患者有特殊的美观要求时，前牙试戴的优点是非常明显的（图 8-8）。前牙试排牙可以：

- 在治疗早期就关注患者的美观需要
- 凸显可能达到和不能达到的美观效果
- 允许技工制作符合人工牙位置的金属支架

如第4章所述，金属基托能紧密贴合前牙鞍基区的支持软组织，为前牙

Anterior try-in

When anterior teeth are to be replaced it is often useful to carry out an anterior try-in at an early stage in treatment. This can be combined with the preliminary registration. The advantages of an anterior try-in are particularly evident, when the patient has specific aesthetic concerns or demands (Fig 8-8). An anterior set-up will:

- attend to the patient's aesthetic concerns early in treatment
- highlight the aesthetic possibilities and limitations
- allow the technician to construct a metal framework that matches the position of the replacement teeth.

As described in Chapter 4, a metal base that closely fits the supporting soft tissues

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图 8-8 a. 通过试戴来明确前牙的排列；b. 然后将排列转移到模型上制作导模，依照导模在模型上制作支架；c. 允许精确地放置固位指；d. 前牙义齿的金属背板

Fig 8-8 (a) An anterior try-in to establish the arrangement of the replacement anterior teeth. This is transferred to the casts on which the framework is constructed using an index of this set-up (b) and this allows accurate positioning of retention tags (c) and metal backing of the anterior denture teeth (d)

义齿留出了更多空间，进而导致了前牙义齿更好的外观。另外，金属背板提高了前牙义齿在颌间距离受限时的长期固位力。用硅橡胶或者石膏糊剂记录与试戴时一致的前牙排列情况，可以允许技师精确地放置固位钉/指，将人工牙固定到金属支架上，并与所有需要的金属背板融为一体。

of an anterior saddle leaves more space for the replacement teeth and this in turn results in a better appearance of anterior denture teeth. In addition, metal backing of the replacement anterior teeth improves the long-term retention of the anterior denture teeth when interocclusal space is limited. A sili-cone or plaster matrix of the arrangement of the replacement anterior teeth confirmed with an anterior try-in allows the technician to position accurately the studs

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or tags needed to retain the replacement teeth to the metal framework and to incorporate correctly any necessary metal backing.

常见错误

- 当模型就位到记录中时，牙齿是分开的。这是因为天然牙和殆堤之间的紧密接触或者是患者咬得太紧（千万不要叫患者"咬在一起"），导致蜡堤偏离支持软组织。
- 研究模型的后部发生接触。
- 使用过多的记录材料，它流入殆面点隙和邻间隙，阻止了模型的精确就位。注意只记录相对的牙尖。良好的操作习惯是在患者离开前，将颌位记录放在研究模型上，并检查其精密性。
- 对殆关系注意不够。

Common errors

- Teeth are apart when the casts are seated into the registration. The wax rim(s) was displaced into the supporting soft tissues because of heavy contact between natural teeth and occlusal rim or the patient closed together too firmly (never ask the patient to "bite together").
- Contact between the heels of the study casts.
- Excessive recording material was used. Its flow into occlusal fissures and embrasure spaces will often prevent accurate seating of the casts into the registration. Record opposing cusp tips only. It is always good practice to seat the jaw registration record on the study casts and to check its accuracy before the patient is dismissed.
- Insufficient attention paid to occlusion.

最终治疗计划

这一步的目的是和患者讨论、确定治疗计划。通常在这一步将决定最终的治疗计划。处理部分缺牙患者的主要目的：在一个稳定、健康的环境中保存余留牙；防止进一步的病理改

Definitive Treatment Plan

The objectives of this stage are to discuss and confirm the treatment plan with the patient. It is at this stage that a decision about the definitive treatment is normally made. The principal objectives when treat-

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变；在必要时恢复功能。收集的信息应该使临床医师能在以下方面作出决定：

- 修复和维持余留牙列健康的必要处理措施。
- 修复缺失牙的必要性，以及对缺失牙的各种不同的修复治疗方案。至于是否应用可摘局部义齿，必须等到观测和设计步骤以后才能决定（见第9章）。
- 最适合患者的治疗计划。其中重要因素包括：患者对治疗的期望值；他们维持充分菌斑控制的能力；他们按时复诊和后期维护的能力；患者其他病史可能导致的并发症；以及不可不提的经济考虑。应该记住的是许多部分缺牙患者年纪偏大，由于口腔卫生情况恶化、健康状况不佳、多种用药情况和长期吃致龋性的食物，短期内或长期后可能出现口腔治疗困难。

ing partially dentate patients are to preserve the remaining teeth in a stable and healthy environment, to prevent further pathological change and, if necessary, to restore function. The collation of information obtained should enable the clinician to determine the following:

- Treatment necessary to restore and maintain the remaining dentition in health.
- The need to replace missing teeth and, where this need exists, the treatment involved in the alternative means of replacing them. With regards to the possible use of a partial denture, this decision may have to await the surveying and design procedure (see Chapter 9).
- The treatment most appropriate for the patient. Factors of importance will be the patient's expectations of treatment, their ability to attain and maintain adequate plaque control, their ability to attend for regular treatment and later maintenance, possible complications arising from the patient's medical history and, by no means least, economic considerations. It should be remembered that many partially dentate patients are elderly and in the short or long-term may present dental management difficulties resulting from a deteriorating oral hygiene, poor health

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and poly pharmacy and a worsening, often cariogenic, diet.

重 点

- 对部分缺牙患者的处理应该基于对患者主诉和要求的评价以及彻底的临床检查。
- 除了记录余留牙的状态，检查还应该包括对义齿承托区、殆关系和义齿使用空间的评估。
- 咬合研究模型是治疗计划的重要辅助。
- 患者的全身健康状况、病史和社会经历对治疗计划的选择有深远影响。

Key Points

- Treatment of partially dentate patients should be based upon an assessment of the patient's complaints and demands and a thorough clinical examination.
- In addition to establishing the dental status of remaining teeth, the examination should include an assessment of the potential denture-bearing areas, occlusal relationships and the availability of space for a prosthesis.
- Articulated study casts are an essential aid to the treatment planning process.
- The patient's general health, medical and social history can have a profound influence on the choice of treatment.

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第 9 章 临床指导 II：确定义齿的设计

Clinical Guide II: Establishing the Denture Design

目 的

本章介绍了一种简单、合理的方法，遵循这一方法，能对可摘局部义齿进行有效的、相应的设计。

Aim

This chapter will present a simple and logical system, which when followed, will produce effective and relevant designs for partial dentures.

要 点

阅读本章后，从业医师应该能够应用所建议的、简单合理的方法来设计可摘局部义齿。

Outcome

After reading this chapter, the practitioner should be able to apply the recommended, simple and logical system of partial denture design.

引 言

第 6 章已经描述了观测器和通过观测模型来确定局部义齿设计的主要原则。为完成义齿设计，请简单地取一张设计单，一个观测器和研究模型，按照以下步骤进行操作。为了方便起见，研究模型应该做成“分离式”，这样它们就能从殆架上的固定石膏中取出，安全地放置到观测器的模型台上（图 9-1）。在设计过程中，我们对每一步骤都提出了注释和建议。

Introduction

The dental surveyor and the broad principles underlying the use of cast surveying to establish the design of a partial denture were described in Chapter 6. Using a simple design sheet, a surveyor and study cast(s), follow the procedure set out below. For convenience, the study cast(s) should be "split-cast" mounted on the articulator to allow them to be separated from the mounting plaster and securely placed on the cast table (Fig 9-1). Comment and suggestions are given for each step in the design process.

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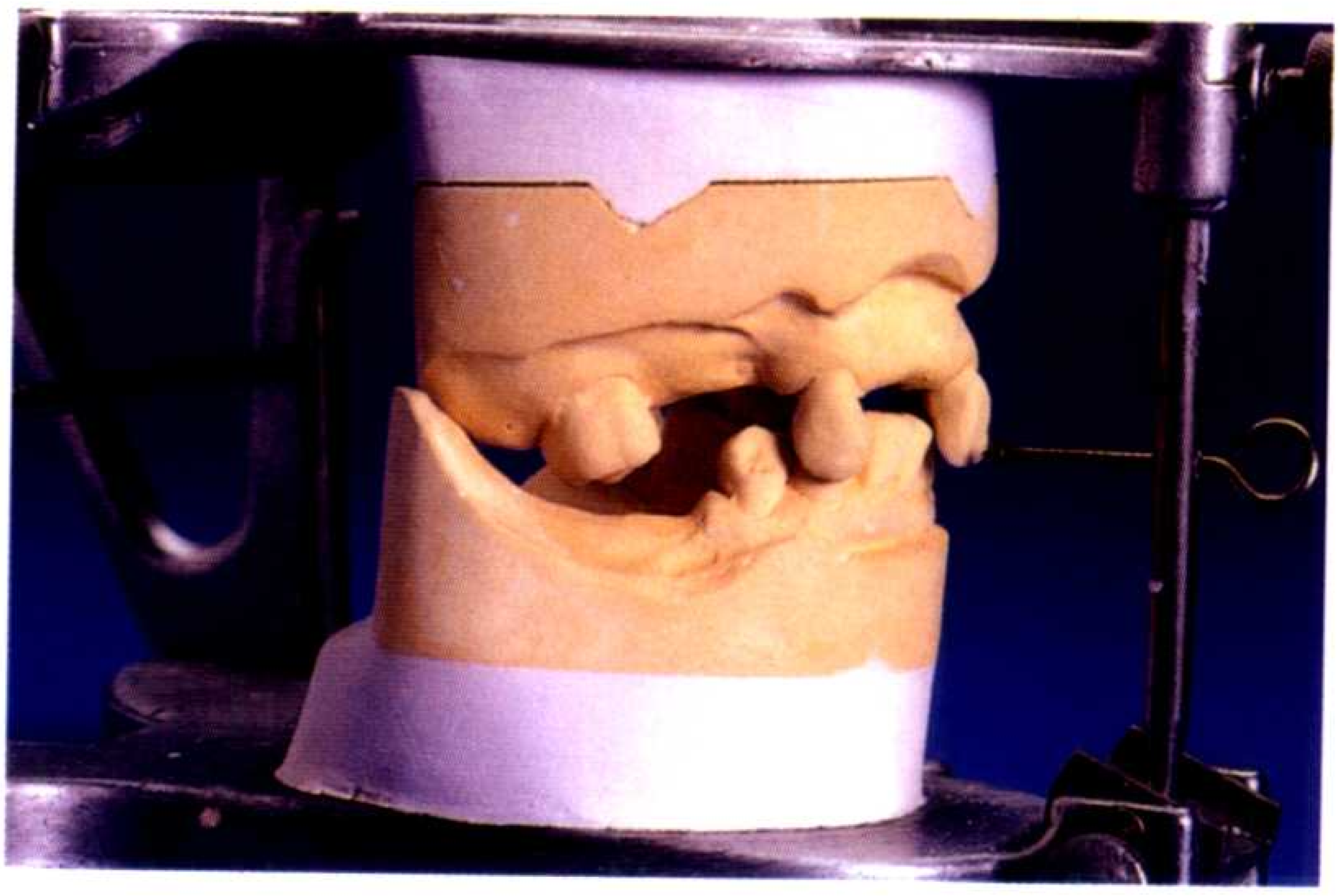


图9-1 研究模型应该做成“分离式”，这样上颌模型就能从殆架的固定石膏中取出

Fig 9-1 Study casts split-cast mounted to allow separation of the upper cast from its mounting plaster

第 1 步

决定要被修复的牙齿，画出鞍基区的轮廓，用支托为鞍基提供牙支持，画出简单的大连接体轮廓（图 9-2）。

注　释

- 不是所有的缺失牙都需要被修复。
- 虽然提供有用支持的顺序是从第一磨牙到下颌切牙，但实际上，人们只是简单地使用可提供的桥基牙，即使牙齿有明显的附着丧失也可以提供有用的牙支持。
- 通常要等到义齿设计完成后才决定大连接体的设计，在下颌，有时这可能会被推迟到取完工作印模以后。

Step 1

Decide which teeth are to be replaced and outline the saddle areas. Provide tooth support for the saddles with rests. Outline a simple major connector (Fig 9-2).

Comments

- Not all missing teeth need to be replaced.
- Although a ranking order of useful support would run from first molars down to lower incisors, pragmatically one simply uses the abutment teeth available. Even teeth with marked loss of attachment can provide useful tooth support.
- The design of the major connector is normally decided when the denture design is finalised and, in the lower arch, may sometimes be delayed until the working impression has been recorded.

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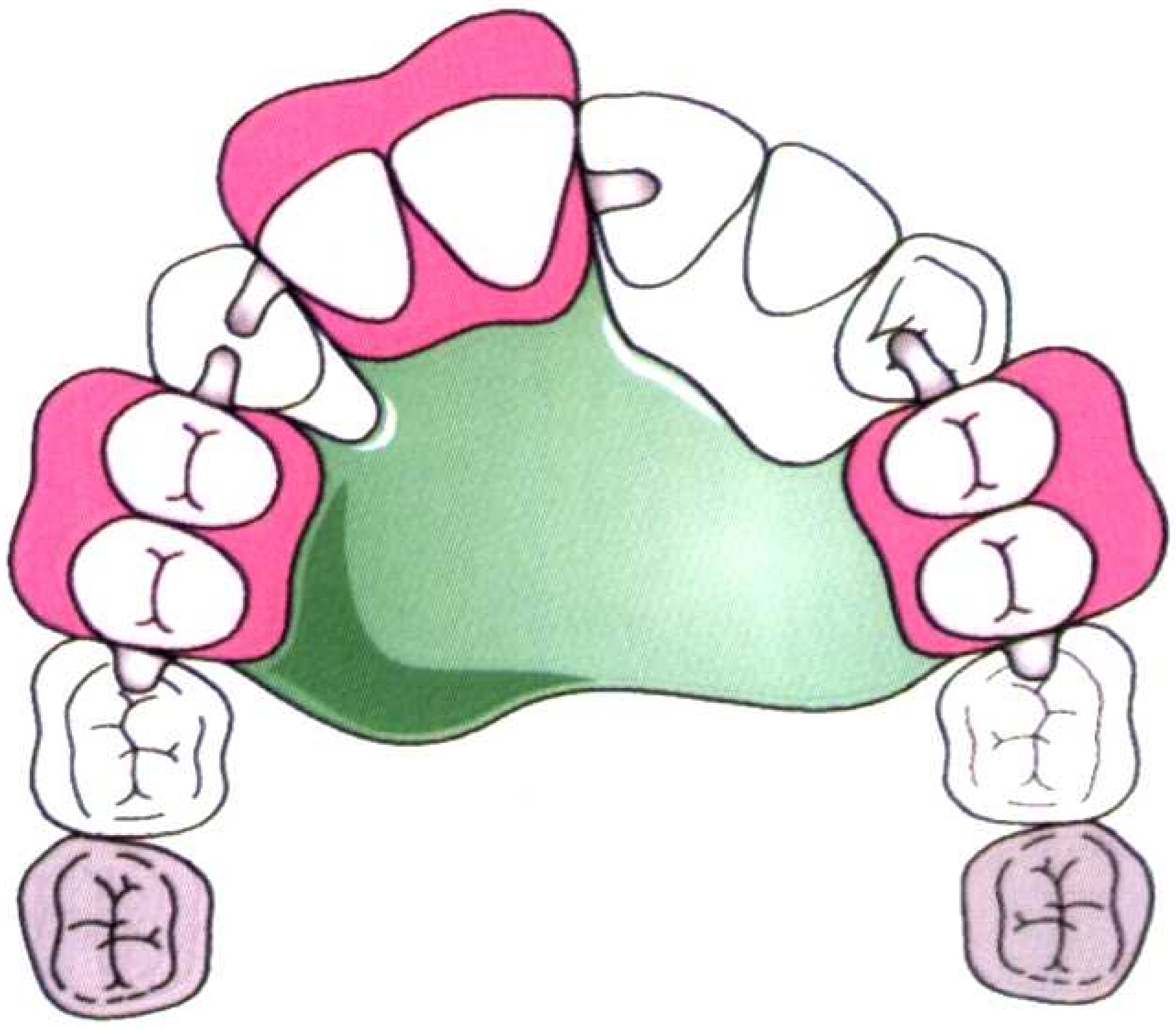


图9-2 第1步：功能上不需要恢复最后一颗缺失磨牙。支托被放置在有界限鞍基的两端，一个简单的大连接体将鞍基连接起来。（不同的颜色可以用来阐明设计——在这个模型上：绿色代表Co-Cr合金，粉红色代表丙烯酸树脂）

Fig 9-2 Step 1: There is no functional need to replace the missing last molars. Rests have been added at each end of the saddles and a simple major connector to join the saddles outlined. (Colour coding can help to clarify the design — in this case: green for cobalt-chromium and pink for acrylic.)

建　议

在有界限鞍基的两端放置支托。对于下颌游离端鞍基，放置近中支托是更好的选择。

Suggestion

Place rests at both ends of a bounded saddle. For lower free-end saddles, mesial placement of the rest is preferred.

第2步

将模型放在观测台上，使殆平面近似水平（图9-3）。

Step 2

Position the cast on the surveyor table with the occlusal plane approximating the horizontal (Fig 9-3).

注　释

对任何义齿而言，可能有几个脱

Comment

For any one denture displacement away

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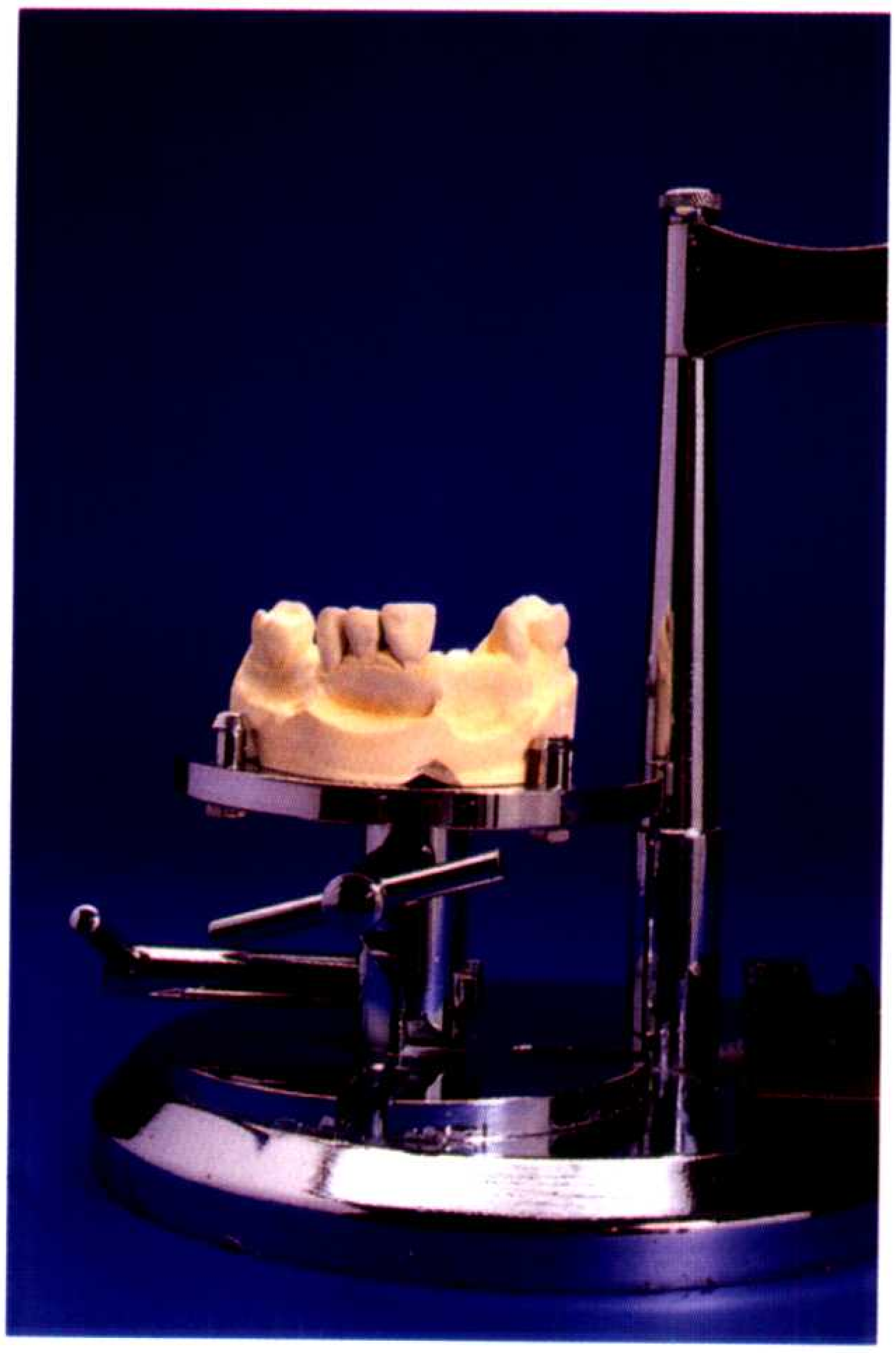


图9-3 第2步：将模型放置在观测台上，使它的殆平面呈水平状态

Fig 9-3 Step 2: The cast positioned on the cast table with its occlusal plane horizontal

位方向。然而，一般认为所有的可摘局部义齿都有沿着与殆平面成直角方向脱位的趋势，即天然脱位道（见第 6 章）。

from the tissues may be possible in several directions. However, it is generally assumed that all partial dentures will have a tendency to withdraw along a path at right angles to the occlusal plane - the path of natural displacement (see Chapter 6).

建　议

记住，与水平观测有关的倒凹都必须用来保证有效的固位。这可以通过仅仅使用卡环固位；或者改变就位道，利用义齿的坚固部分固位；或者是两者的联合。

Suggestion

Remember, undercut relative to this horizontal survey must be engaged to ensure effective retention. This can be by clasps alone or, by modifying the path of insertion, a rigid part of the denture, or a combination of both.

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第3步

通过观测模型，用红色铅芯确定有用的（固位）倒凹（图9-4）。

注 释

这些倒凹通常在桥基牙的颊侧、舌侧和邻面。也可能在缺牙区，例如，与前牙缺失区有关的唇侧倒凹。

固位倒凹不能通过倾斜模型来产生。虽然卡环可以设计成利用这种倒凹，但它们不能防止义齿的天然脱位，因为在天然脱位道方向，这个倒凹就不存在了。

Step 3

Identify usable (retentive) undercut by surveying the cast with a red lead (Fig 9-4).

Comments

This undercut can normally be found on buccal, lingual and proximal surfaces of abutment teeth. It may also be present in relation to edentulous areas – for example, labial undercut in relation to an anterior edentulous space.

Retentive undercut cannot be “created” by tilting the cast. Although clasps can be designed to engage the “created” undercut, they will not prevent natural displacement as the undercut is not present relative to natural displacement.

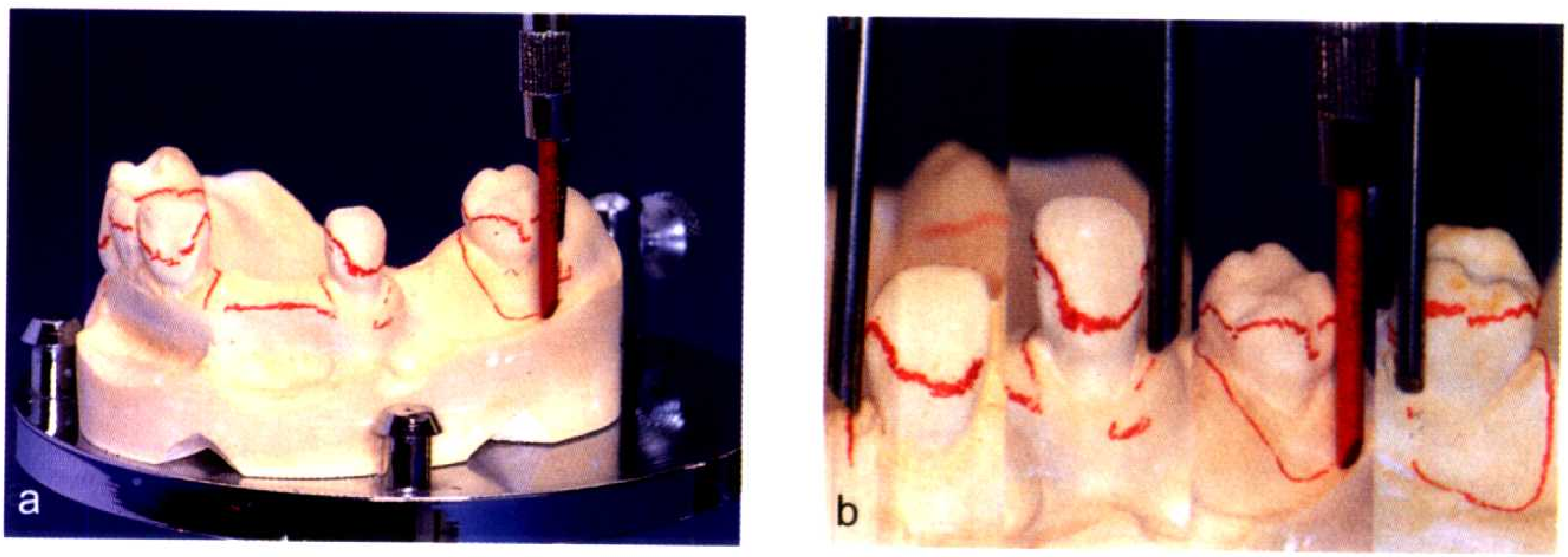


图9-4 第3步：a. 用红色铅芯来完成水平观测；b. 有用的固位倒凹出现在所有桥基牙的颊侧。倒凹还可出现在|3的远中面，以及3|的远中面，后者的倒凹稍浅

Fig 9-4 Step 3: (a) The horizontal survey has been completed using a red lead, (b) Useful retentive undercut is present on the buccal surfaces of all abutment teeth. Proximal undercut is also present on the distal surface of UL3 and, to a lesser extent, the distal surface of UR3

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建 议

如果通过水平观测发现没有可利用的倒凹，为了抵抗天然脱位道，就必须制备倒凹。一种制备可以被卡环利用的倒凹的方法是在桥基牙的颊侧面简单地添加酸蚀固位的复合树脂。

Suggestions

If there is no usable undercut with the horizontal survey, then it must be created if natural displacement is to be resisted. An example is the creation of undercut to be engaged by a clasp by the simple addition of etch-retained composite to the buccal surface of an abutment tooth.

第 4 步

考虑美观和干扰对就位道的影响。用分析杆继续检查模型，根据需要改变模型的倾斜角度（图 9-5）。

Step 4

Consider the influence of aesthetics and interferences on the path of insertion. Continue your examination of the cast with an analysing rod and modify the cast tilt as necessary (Fig 9-5).

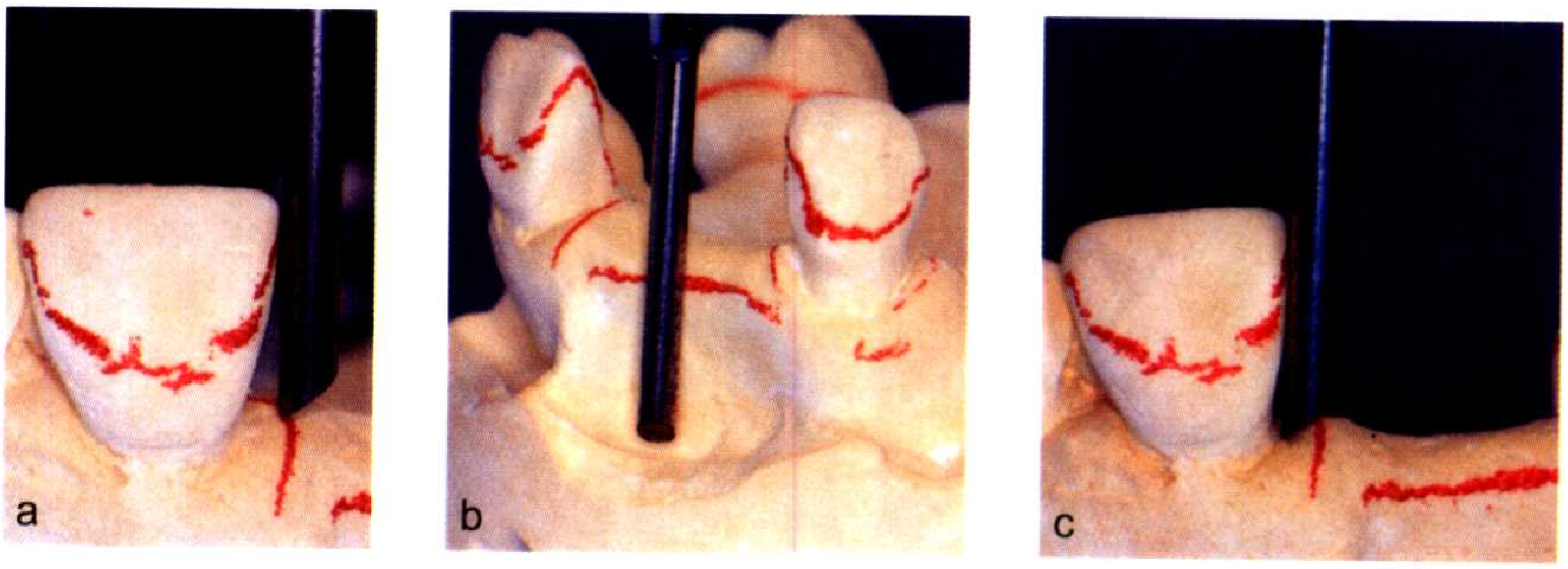


图 9-5 第 4 步：a. 水平观测确定的就位道造成了⌊1 的近中面死区；b. 唇侧深的软组织倒凹妨碍了唇侧基托的使用；c. 通过将模型微微向左以及后部向下倾斜，形成了新的就位道，减少了软组织倒凹，因而可能放置唇侧基托，并使⌊1 的近中死区最小化

Fig 9-5 Step 4: (a) The path of insertion for the horizontal survey results in dead space mesial to UL1 and (b) deep soft tissue undercut labially that prevents the use of a labial flange. (c) A new path of insertion created by tipping the cast down at the back and slightly to the left reduces the soft tissue undercut and thus allows placement of a labial flange and minimises unsightly dead space mesial to UL1

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注 释

当恢复缺失的前牙时，为了消除人工牙和桥基牙之间难看的缝隙以及为了在缺牙区应用唇侧基托（除非禁忌），常会严重限制对就位道的选择，此时通常采用由前向后的就位方向。

对于游离端鞍基义齿，如果在水平方向出现倒凹，观测时常常选择一种就位道使桥基牙远中邻面的倒凹减少或消除。这可以通过倾斜使模型前部降低，从而允许鞍基的坚硬部分抵抗天然脱位道，提高固位。

当游离端鞍基伴有前牙区缺失时，选择就位道时应该首先确保美观效果，然后才是固位。

建 议

如果通过水平观测确定的就位道满足设计要求，特别是满足美观和固位需要时，就没有必要去改变它。要尽量避免就位道与天然脱位道的明显不同，因为不容易设计可以抵抗天然脱位的卡环。例如，很少需要将唇侧基托延伸到唇沟底——这就避免了需要选择一个必须消除所有唇侧软组织倒凹的就位道。

Comments

When replacing lost anterior teeth, both the elimination of unsightly gaps between replacement and abutment teeth and the use of a labial flange (unless contraindicated) will often severely restrict the choice of a path of insertion. This will normally be from before backwards.

For free-end saddle dentures, it is usual to select a path of insertion that eliminates or reduces proximal undercut on the distal surface of abutment teeth if this undercut is present at the horizontal survey. This improves retention by allowing rigid parts of the saddle to resist natural displacement and is achieved by tipping the cast down at the front.

When free-end saddle dentures have anterior modification spaces, a path of insertion that ensures a good appearance will take priority over optimum retention.

Suggestions

If the path of insertion at the horizontal survey satisfies the design requirements for, in particular, retention and aesthetics, there is no need to alter it. Try to avoid paths of insertion that differ markedly from the path of natural displacement as this may cause difficulties designing clasps that resist natural displacement. For example, it is rarely necessary to extend a labial flange to the

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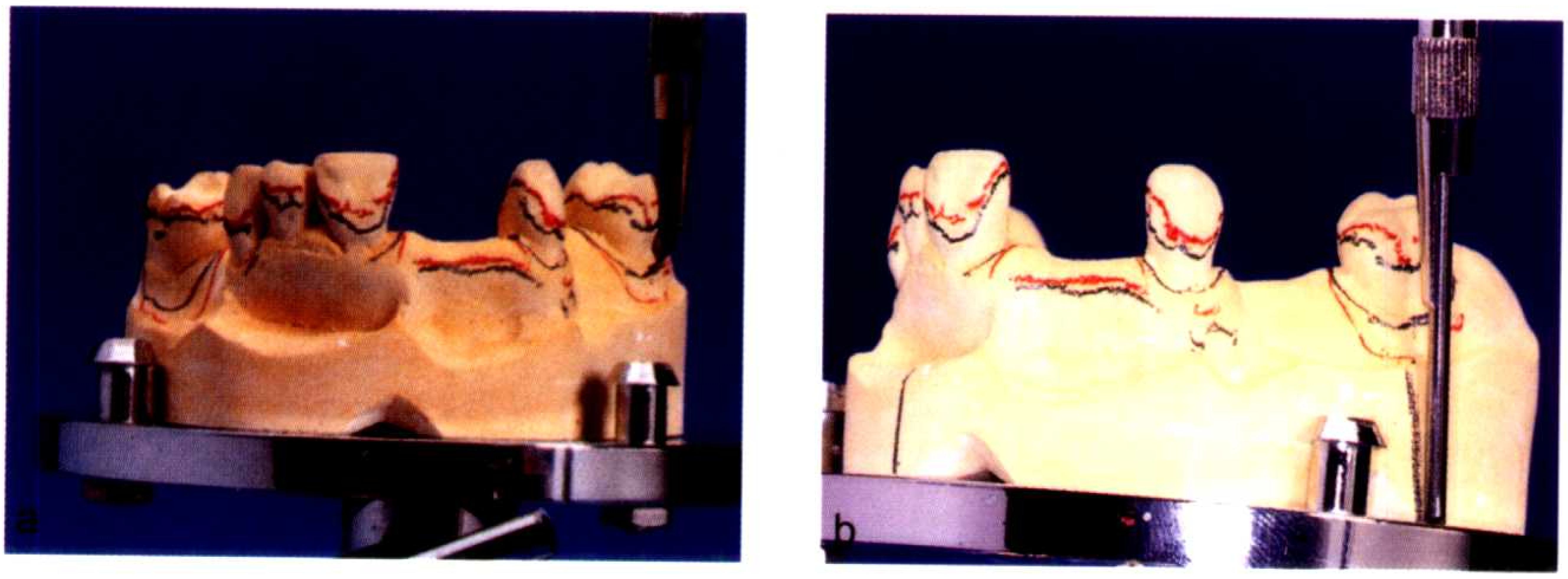
depth of the labial sulcus – this avoids the need to select a path of insertion that eliminates all labial soft tissue undercut.

第 5 步

当你决定了一个合适的就位道后，锁紧模型台。用黑色的标记铅芯画出硬组织和软组织上的所有倒凹区。在模型底座的 3 个面上标出就位道的方向，将分析杆在一个固定的水平面上移动，通过在模型上标出广泛分开的 3 个点来做出 3 个转移三角标记（图 9-6）。

Step 5

When you have decided on a suitable path of insertion, lock the cast table. Using a black marking lead, map out all undercut areas on both hard and soft tissues. Mark the path of insertion on three sides of the base of the cast. Make three transfer tripod marks by marking three widely separated points on the cast that are touched by the



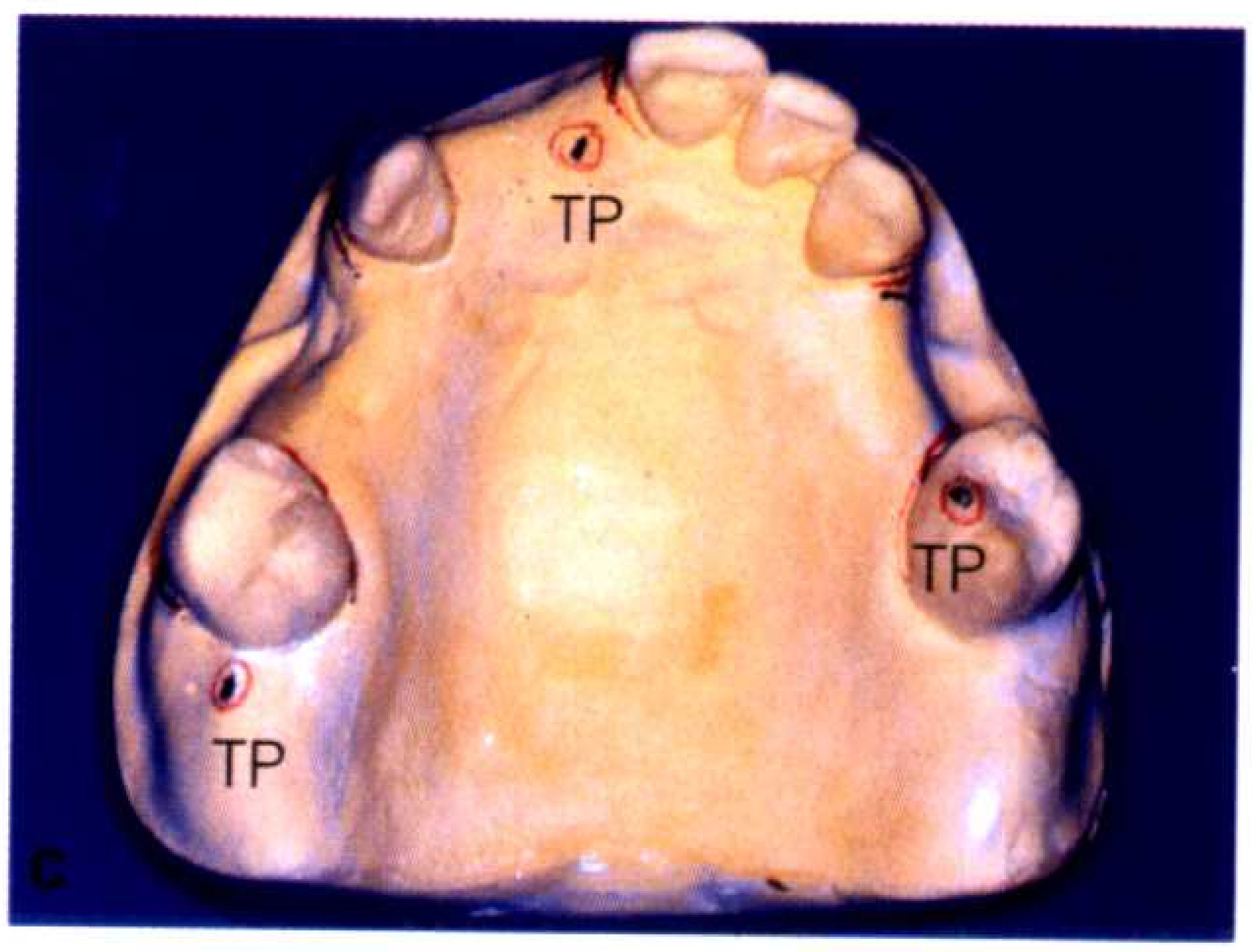


图 9-6　第 5 步：a. 已经确定就位道后，固定观测台，用黑色铅芯来观测模型，并与水平观测时所描画的红色形成对照；b. 在研究模型上运用底座标记来记录就位道；c. 转移三角点（TP）

Fig 9-6　Step 5: (a) The path of insertion has been decided. The cast table is locked and the cast resurveyed using a black lead to contrast with the red of the horizontal survey. Note the change in undercut distribution, (b) The path of insertion is recorded using base markings on the study cast and (c) transfer tripod points (TP)

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analysing rod as it moves through a fixed horizontal plane (Fig 9-6).

注　释

水平观测线和最后观测线的颜色对照，可以允许我们轻易地分辨出天然就位道和最终就位道的共同倒凹区。通过转移三角点可以将最终选择的就位道从研究模型转移到工作模型上。

Comment

Contrasting colours for the horizontal and final survey allow the ready identification of undercut common to both paths of insertion. Transfer tripod points allow the transfer of the chosen path of insertion from the study cast to the working cast.

第6步

完成卡环的设计，保证它们的交互作用（图9-7）。

Step 6

Complete the design of any clasps. Ensure that they are reciprocated (Fig 9-7)

注　释

对于大多数可摘局部义齿而言，两个有效的卡环就能提供足够的固位。在理想状态下，应该使用在水平观测方向和选择的就位道方向共有的倒凹。

Comment

For most partial dentures, two effective clasps will provide sufficient retention. Ideally these should engage undercut common to both the horizontal survey and the selected path of insertion.

建　议

如果可能，在牙弓的对角方向上放置2个卡环。对于Co-Cr合金，卡环固位臂的尖端要进入的倒凹深度为0.25～0.5mm，金合金卡环则为0.5～0.75mm。

尽可能减少卡环臂的暴露，尤其是在口腔前部。对于殆向式卡环，利用近中倒凹能使卡环臂的邻面2/3位于桥基牙远中，仅尖端在龈缘；对于龈

Suggestions

Where possible, position two clasps on a diagonal across the arch. For cobalt-chromium clasps the tip of the retentive clasp arm should engage 0.25 – 0.5 mm depth of undercut, for gold clasps 0.5 – 0.75 mm is appropriate.

Try to minimise the display of clasp arms, in particular, towards the front of the mouth. For an occlusally approaching clasp a mesial undercut allows the proximal two-

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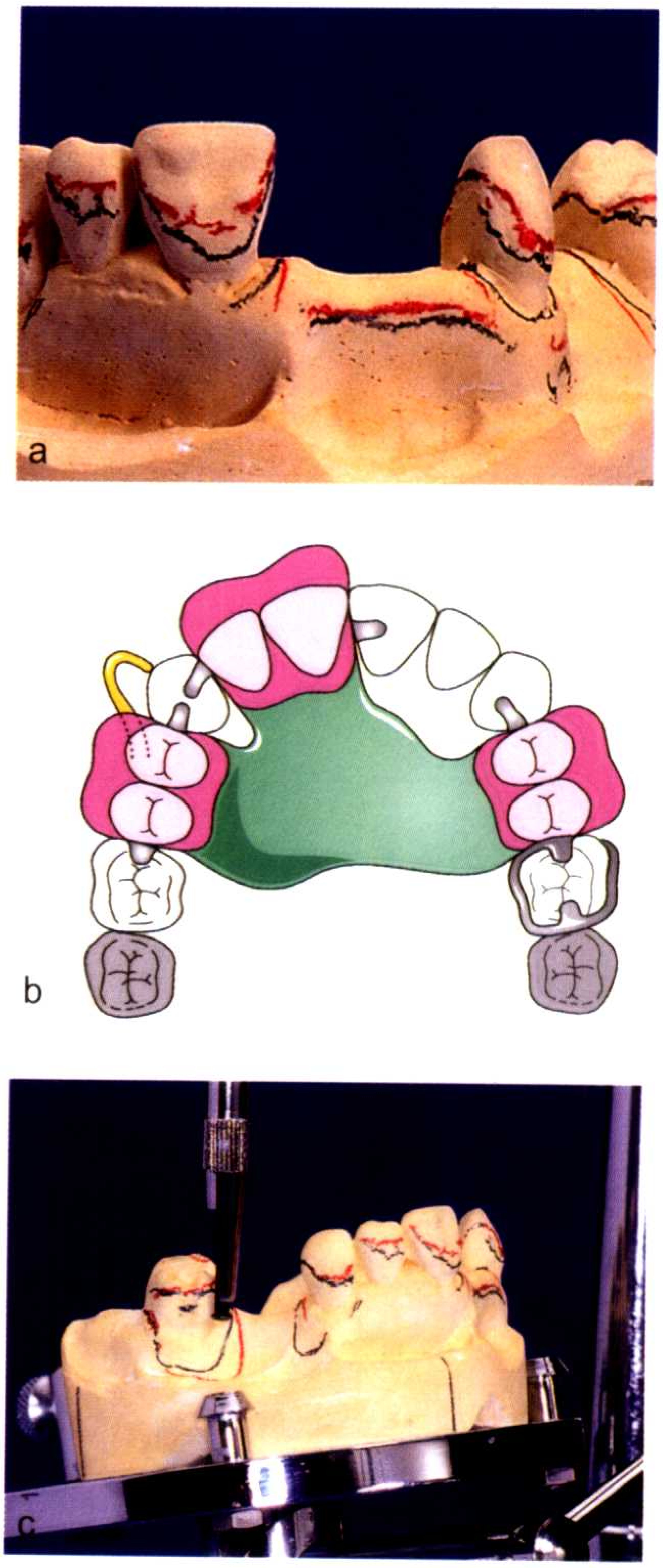


图9-7 第6步：a. 在3|上放置卡环有利于控制相邻的鞍基，倒凹的分布允许使用一个简单的、龈向就位的I杆，锻造金合金能改善卡环的外观。这也表明在|6上放置卡环能使卡环轴成对角线方向，根据倒凹的分布，采用圈形卡环可以使卡环利用桥基牙近中颊侧倒凹；b. 将卡环添加到义齿设计中。利用舌隆突支托对抗3|的卡环固位臂。在|6上添加远中支托能保证卡环臂腭侧部分的坚固性，同时对抗卡环臂进入近中颊侧倒凹区的末端 1/3 部分；c. 用一个 0.5mm 的倒凹尺标出卡环尖端的位置

Fig 9-7 Step 6: (a) It would be advantageous to place a clasp at UR3 as this will offer some control of both adjacent saddles. The undercut distribution will allow the use of a simple gingival approaching I-bar. Wrought gold will improve the appearance of this clasp. This then suggests the use of a clasp at UL6 to place the clasp axis on a diagonal. The distribution of undercut indicates the use of a circumferential clasp to engage the mesiobuccal undercut. (b)The clasps are added to the denture design. The cingulum fest will reciprocate the retentive clasp arm at UR3. The addition of a distal rest at UL6 will ensure rigidity of the palatal part of the clasp arm which will reciprocate the terminal third entering the mesiobuccal undercut. (c) The position of the clasp tip in undercut has been marked using a 0.5 mm undercut gauge

向式卡环，最好利用远中倒凹，使卡环臂不易暴露。

如果倒凹的位置不允许美观地放置卡环，可以考虑"制作"更有利的倒

thirds of the arm to be distal to the tooth and the termination at the gingival margin. For a gingivally approaching clasp, it may be better to use a distal undercut so that the arm of the retainer is less visible.

If the location of undercut does not allow aesthetic placement of the clasp, con-

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凹分布：通过简单地降低观测线和添加酸蚀固位复合树脂（见第10章牙体预备）。

sider "engineering" a more favourable undercut distribution through the simple combination of lowering survey lines and the addition of etch-retained composite (see tooth preparation in Chapter 10).

第7步

考虑设置间接固位体的必要，完成大连接体的设计（图9-8）。

Step 7

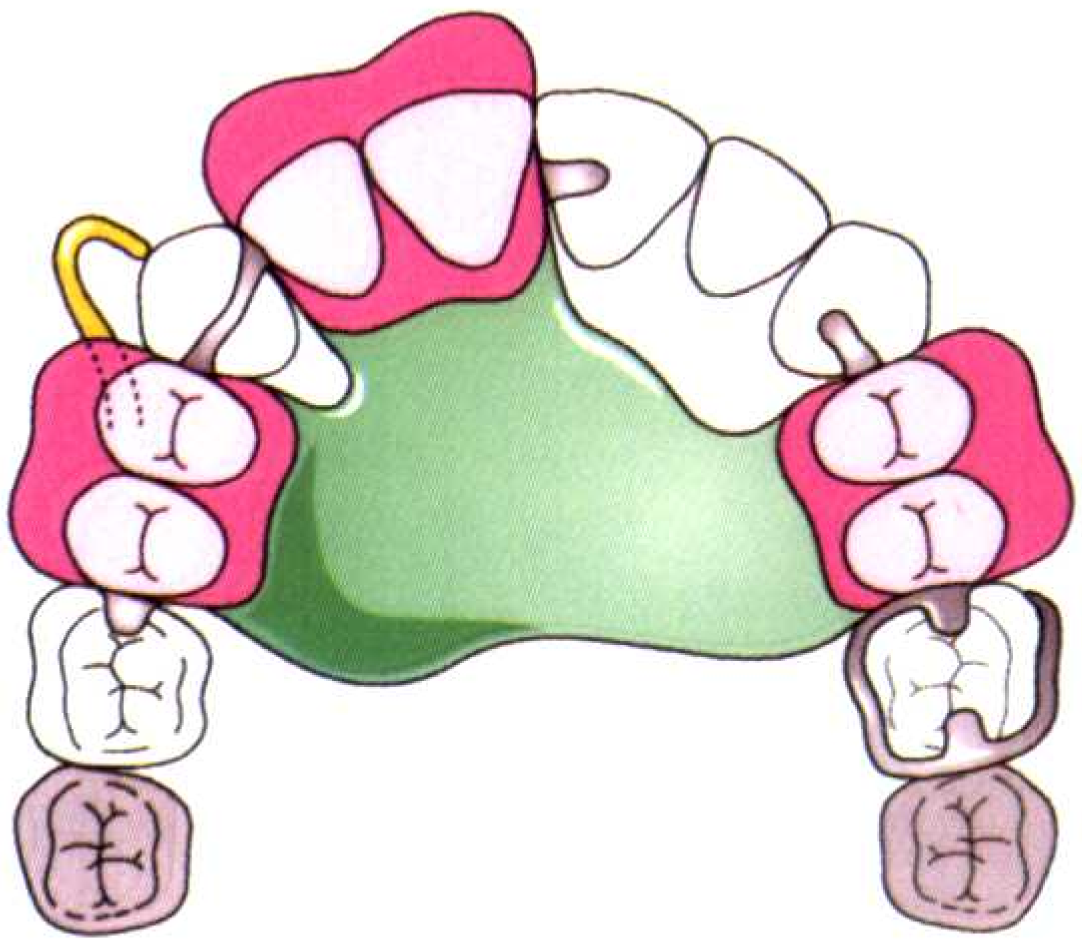
Consider the need for indirect retention. Complete the design of the major connector (Fig 9-8).

注　释

提供间接固位体仅对于下颌游离端鞍基义齿是真正必要的，主要是因为像间接固位体这类部件会有助于今后的义齿重衬。

Comments

Provision of indirect retention is only really necessary for lower free-end saddle dentures largely because components acting as indirect retainers will facilitate later reline procedures.



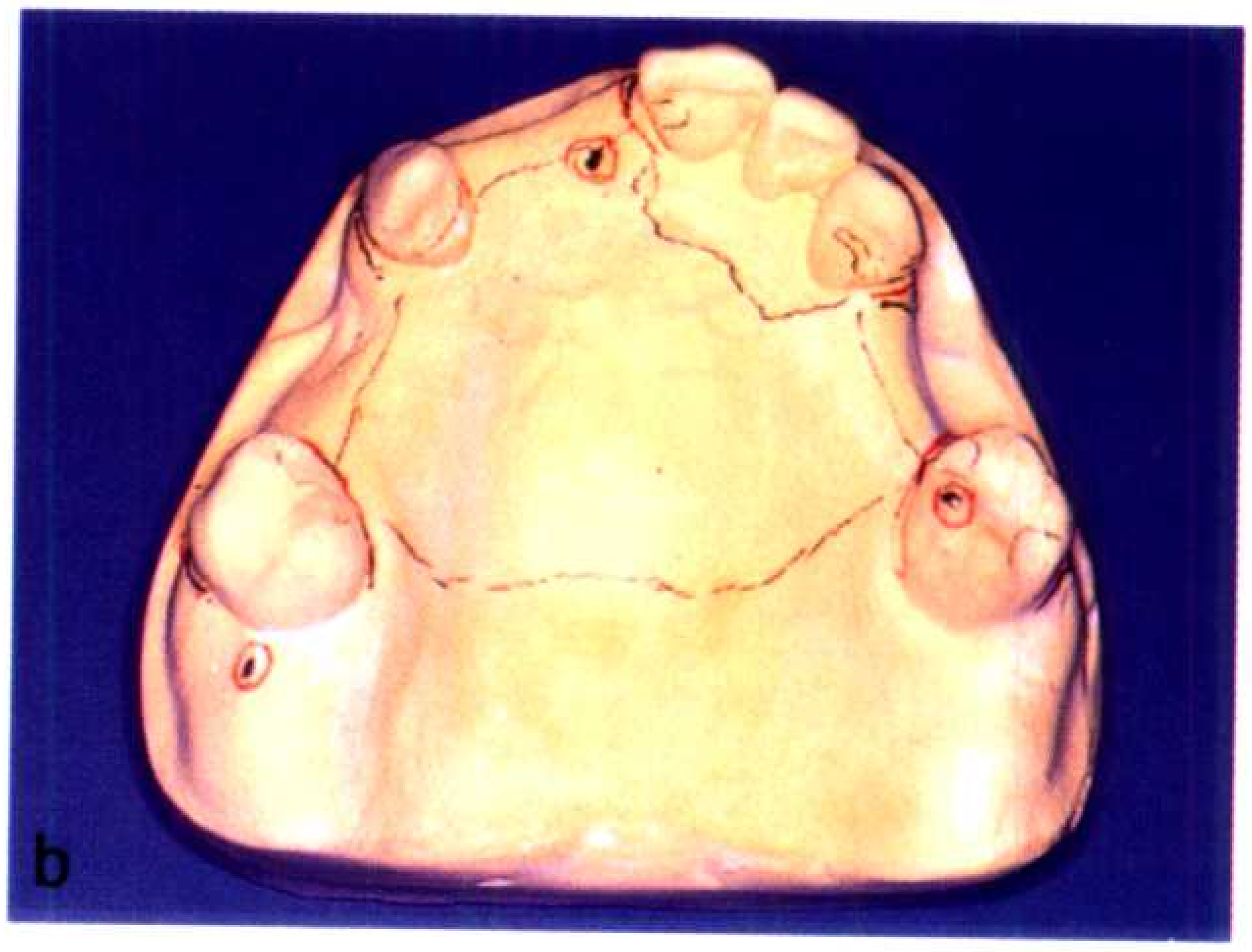


图9-8　第7步：a. 完成大连接体的设计中间接固位并非必需的。虽然不希望牙龈边缘被覆盖，但如果将右上颌尖牙腭侧龈边缘留出空间会形成一个窄的停滞区。在这个病例中，需要将连接体延伸到右上颌尖牙上，通过舌隆突支托形成支持。b. 在研究模型上画出大连接体的轮廓

Fig 9-8　Step 7: (a) Indirect retention is not necessary and the design of the major connector is completed. Although coverage of the gingival margin is desirable, clearing the gingival margin palatally to UR3 will result in a narrow stagnation area. In this case, the connector has been extended onto UR3 and is supported by a cingu-lum rest, (b) It is helpful to outline the major connector on the study cast

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最好采用将龈边缘留出空隙的连接体设计方式。如果连接体必须覆盖龈边缘，请保证足够的牙支持。

对于上颌牙弓，很少存在将牙龈边缘留出空隙的困难。对于下颌牙弓，为了保持足够的空隙，必须保证在牙龈边缘和舌沟的功能性深度之间有大约 7mm 的距离。

A connector design that leaves the gingival margins free is preferred. If the connector must cover the gingival margin, ensure adequate tooth support.

Clearance of the gingival margin is rarely a problem in the upper arch. In the lower arch there should be about 7 mm between the gingival margin and the functional depth of the lingual sulcus to ensure adequate clearance.

建　议

采用简单设计胜过那些理论上有优越性的间接固位设计：如果采用间接固位体使设计过于复杂，就不要采用它。

同时，如果由于空间不足，不能使用舌杆则而选择舌板时，请考虑使用更加卫生的舌下杆或牙杆。

Suggestions

A simple design outweighs the theoretical advantage of indirect retention. If provision of indirect retention overcomplicates the design do not include it.

Whilst a lingual plate is the easy option if the lack of available space prevents the use of a lingual bar, consider the use of the more hygienic sublingual or dental bar.

第 8 步

完成设计草图（图 9-9）。

Step 8

Finalise the design prescription (Fig 9-9).

注　释

检查你的设计与天然牙的𬌗关系，如果设计的组件可能产生𬌗干扰，必须计划进行牙体预备或者更改设计。

Comment

Examine the relationship of your design to the occlusion of the natural teeth. If components of the design are likely to interfere with the occlusion, tooth preparations must be planned or the design modified.

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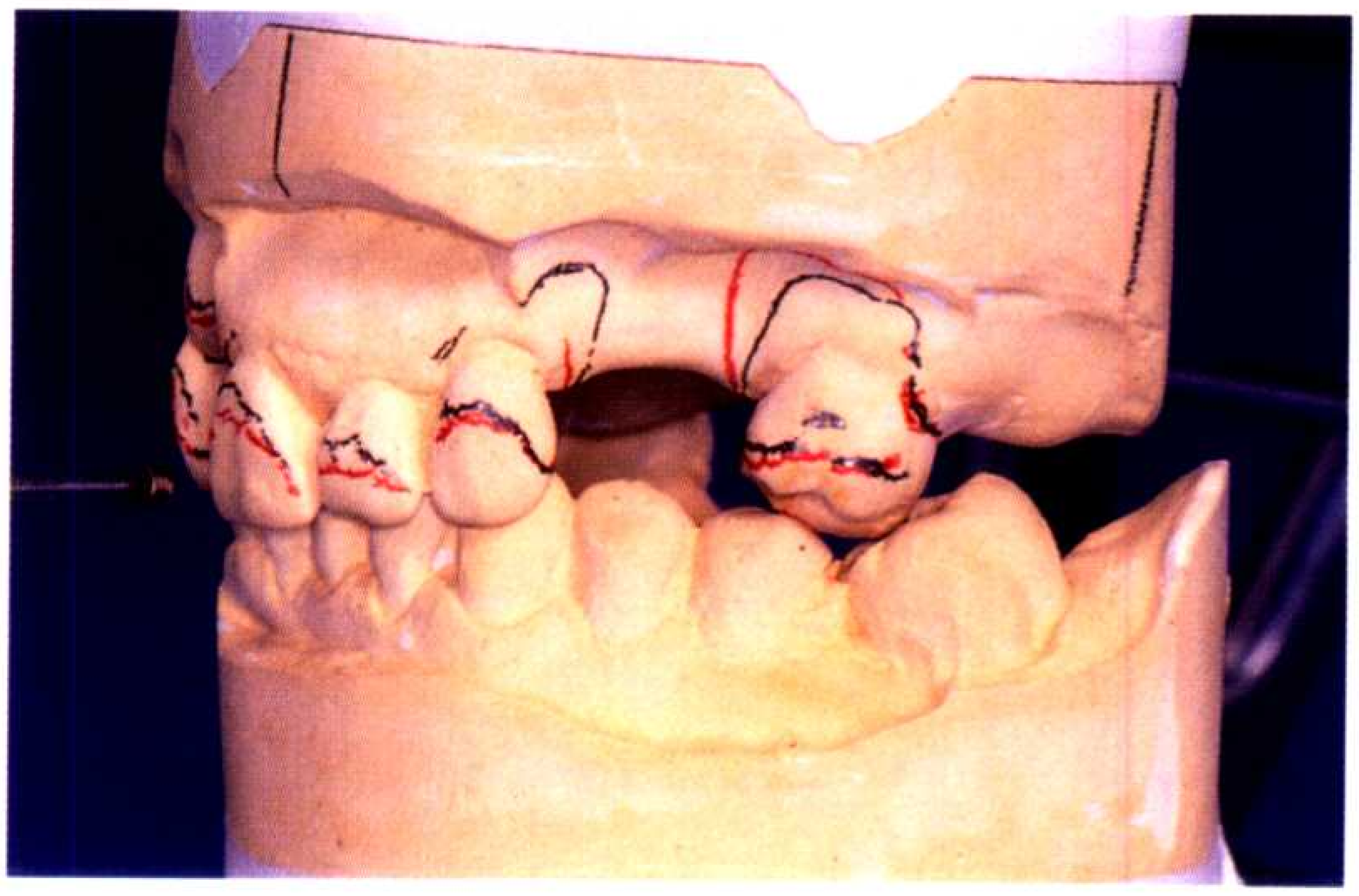


图9-9 第8步：通过殆架核查咬合对设计的影响。在这个病例中，所有组件都有空间放置，只需要在63|136上进行支托凹的预备

Fig 9-9 Step 8: The influence of the occlusion on the design is checked on the articulated study casts. In this case, there is room for all components. The only tooth preparations required are rest seat preparations at UR6, UR3, UL1, UL3 and UL6

建 议

常规牙体预备是降低观测线和预备支托凹，前者与卡环臂根部的放置有关，后者则为坚固的支托提供足够的空间。

这一步骤中的常见错误

- 对殆关系注意不够。
- 不能保证在天然脱位道方向的固位。

重 点

- 观测和设计过程的起点是确定与可摘局部义齿可能的脱位道——天然脱位道相关的倒凹。
- 利用可摘局部义齿的组件，如卡环或义齿的坚固部分，可以抵抗

Suggestion

Common preparations are lowering survey lines in relation to the root of clasp arms, and rest seat preparations to provide adequate clearance for rigid rests.

Common errors at this stage

- Insufficient attention paid to the occlusion.
- Failure to ensure retention along the path of natural displacement.

Key Points

- The starting point of the surveying and design procedure is the identification of undercut relative to the likely path of displacement of a partial denture - the path of natural displacement.
- The introduction of denture components such as clasps or rigid parts of

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这种脱位，保证义齿固位。

- 选择不同于天然脱位道的就位道的指征：前牙修复时需要提高美观效果，或者使游离端鞍基义齿获得最大固位。
- 避免使选择的就位道与天然脱位道相差太远。
- 干扰显著影响合适就位道的选择，甚至可能妨碍使用可摘局部义齿。
- 卡环是在确定就位道以后再设计的。

the partial denture to resist this displacement will ensure retention.

- The main indications for a path of insertion that differs from that of natural displacement are to improve aesthetics when anterior teeth are to be replaced and to maximise retention in free-end saddle dentures.
- Avoid the use of a path of insertion that differs markedly from the path of natural displacement.
- Interferences can profoundly influence the choice of a suitable path of insertion and may prevent the use of a partial denture.
- Clasps are designed after the path of insertion has been established.

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第10章 临床指导Ⅲ：可摘局部义齿的口内预备

Clinical Guide III: Preparation of the Mouth for Partial Dentures

目　的

这一章旨在描述对余留天然牙齿的预备，这些牙体预备有利于可摘局部义齿的设计；同时着重介绍了简单的釉质调磨的应用，并概述了使用铸造冠修复体改变桥基牙牙体外形的临床技术。

Aim

This chapter aims to describe preparations of the remaining natural teeth that are commonly required to facilitate the design of the partial denture. It will emphasise the use of simple enamel reshaping and will outline the clinical techniques used when alterations to tooth shape are incorporated into cast coronal restorations in abutment teeth.

要　点

阅读本章后，操作者应该了解常规牙体预备的设计，并知道如何通过简单的釉质调磨和配合应用铸造冠修复体来完成牙体预备。

Outcome

After reading this chapter the practitioner should be aware of the design of commonly used tooth preparations and understand how these may be achieved both by simple enamel reshaping and by incorporation into cast coronal restorations.

引　言

可摘局部义齿的口腔预备包括两个独立的阶段。第一个阶段是在制作

Introduction

There are two separate phases of mouth preparation for removable partial dentures.

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义齿之前，创造一个健康的口腔环境，包括必要的牙周、牙体修复、根管治疗、正畸和外科治疗。第二阶段是口腔牙体预备，包括改变牙齿外形，使之适合设计的可摘局部义齿并行使功能。本章主要讲述的是第二阶段。

The first phase involves the creation of a healthy oral environment prior to construction of the prosthesis and includes periodontal, operative, endodontic, orthodontic and surgical treatment as is required. The second phase of mouth preparation involves the alteration of tooth contours to allow the proper fit and functioning of the proposed removable partial denture. It is to this phase of the mouth preparation that this chapter is devoted.

牙体预备

通过观测患者的研究模型所获得的信息将指导我们进行牙体预备，这也是将义齿最终设计付诸事实所必需的步骤。常见的牙体预备包括：

- 预备导平面。
- 降低观测线，改善卡环位置。
- 预备支托凹。
- 为卡环创造固位倒凹。
- 扩大外展隙，为卡环臂在两牙之间通过提供空间，并允许小连接体有足够的位置连接支托和大连接体。
- 减少干扰。例如：毗邻前牙缺失区牙齿的邻面；以及向舌侧倾斜的、可能干扰支架放置的下颌前磨牙的舌侧突起。

Tooth Preparation

Information gained from surveying the patient's study casts will indicate modifications of tooth structure that may be required to put the finalised denture design into practice. Modifications that are often required include:

- Preparation of guide surfaces.
- Lowering survey lines to improve clasp placement.
- Rest seat preparations.
- Creation of retentive clasp undercut.
- Embrasure widening to provide space for clasp arms passing between teeth and to allow sufficient bulk of minor connectors joining rests to the major connector.
- The reduction of interferences, e.g. proximal surfaces of teeth adjoining anterior edentulous spaces and the lingual bulge of mandibular premolars

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that are tipped lingually and could interfere with the placement of the framework.

• 调节殆平面水平。

• Adjustments to the level of the occlusal plane.

应该在对上殆架的研究模型进行观测和设计以后，再来制定备牙方案，因为这样可以清楚地指示任何需要做牙冠外形改变的位置以及程度。对大多数患者而言，这些预备仅限定于桥基牙上，而且能够通过简单的釉质调磨获得。没有必要通过常规应用冠修复来获得一个理想的牙冠外形，也很少有证据表明这种行为有什么功能上的优势。冠修复的牙体预备需要不可逆地磨除大量的牙体组织，而且冠还受长期应用后可能失败的影响，冠也不足以替代正常的冠部牙体组织。然而，当牙体因大面积充填或磨耗而需要做冠修复时，这就为把任何必要的支托凹、固位倒凹或者导平面整合到修复体内提供了一个理想的机会。

Tooth preparations should be planned using the articulated study casts following surveying and partial denture design. This allows a clear indication of both the position and extent of any necessary modification to the coronal contour. For most patients these preparations will be confined to abutment teeth and can be achieved by simple enamel reshaping. The routine use of crowning to achieve an ideal coronal shape is not necessary, there being little evidence that this practice confers any functional advantage. Crown preparation requires the irreversible removal of considerable amounts of tooth tissue. Crowns are subject to long-term failure and cannot be considered an adequate substitute for sound coronal tooth tissue. However, where the presence of an extensive restoration or wear indicates the need for a cast coronal restoration, this provides an ideal opportunity to incorporate any necessary rest seats, retentive undercut or guide surfaces within the restoration.

一个良好的操作习惯是列出所有需要操作的牙体预备，然后在研究模型上标记出预备的位置。如果在研究模型上完成所有预备，并经重新观测

It is always good practice to list the tooth preparations required and to mark the position of these preparations on the study casts. If the preparations are then made on

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后确定预备已经完成，那么就能对预备的位置和程度作一个较好的评估。有了这些信息，就能充满信心的开始备牙了。

the study casts and the casts resurveyed to confirm that the preparations have been completed, a good estimate of the position and the extent of any preparations can be gained. Armed with this information, tooth preparation can be embarked upon with confidence.

推荐的临床牙体预备顺序如下：

- 预备导平面
- 降低观测线，改善卡环位置
- 扩大外展隙
- 预备支托凹
- 创造固位倒凹

A suggested clinical sequence for tooth preparations is as follows:

- prepare guide surfaces
- lower survey lines to allow an improved clasp location
- carry out embrasure widening
- prepare rest seats
- create retentive undercut.

建议选用合适形态和大小的涡轮机来去除主要釉质，然后用砂石和抛光橡皮轮来进行精修。

It is recommended that the majority of enamel reduction is done using air rotor diamonds of the appropriate shape and size. Then further refinements are made using stones and abrasive-impregnated rubber points.

导平面

导平面的牙体预备要求沿着并保持预备牙体的外形、均匀及最小量地去除牙釉质。运用砂片，导平面的预备毋须破坏牙体组织（图10-1）。导平面最常见是预备在桥基牙靠近缺隙侧的邻面。根据经验，邻面的导平面宽度约等于桥基牙颊、舌尖之间的距离，且在垂直方向上延伸2～3mm或更多（条件允许时），很好地终止于龈缘以上。当预备面向舌侧延伸时，邻面的天然外

Guide surfaces

Preparation of guide surfaces requires an even and minimal reduction of enamel, following and maintaining the contour of the involved surface of the tooth. Flat preparations, using discs, are needlessly destructive of tooth tissue (Fig 10-1). Guide surfaces are most frequently prepared on the proximal surfaces of abutment teeth adjacent to the edentulous spaces. As a rule of thumb, proximal guide surfaces should

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形导致导平面的舌侧高度减少（图10-2）。较少见的时候，导平面被预备在舌面用来辅助卡环的交互作用，这些面位于与卡环尖直接相对的牙面上。

be about as wide as the distance between the tips of the buccal and lingual cusps and should extend vertically 2–3 mm, or more if possible, finishing well above the gingival margin. The natural contour of a proximal surface results in the reduction of height lingually as the preparation tapers towards the lingual surface (Fig 10-2). Less commonly, guide surfaces are prepared on the lingual surface to aid clasp reciprocation. These surfaces are located on the tooth surface directly opposite the proposed site of the clasp tip.

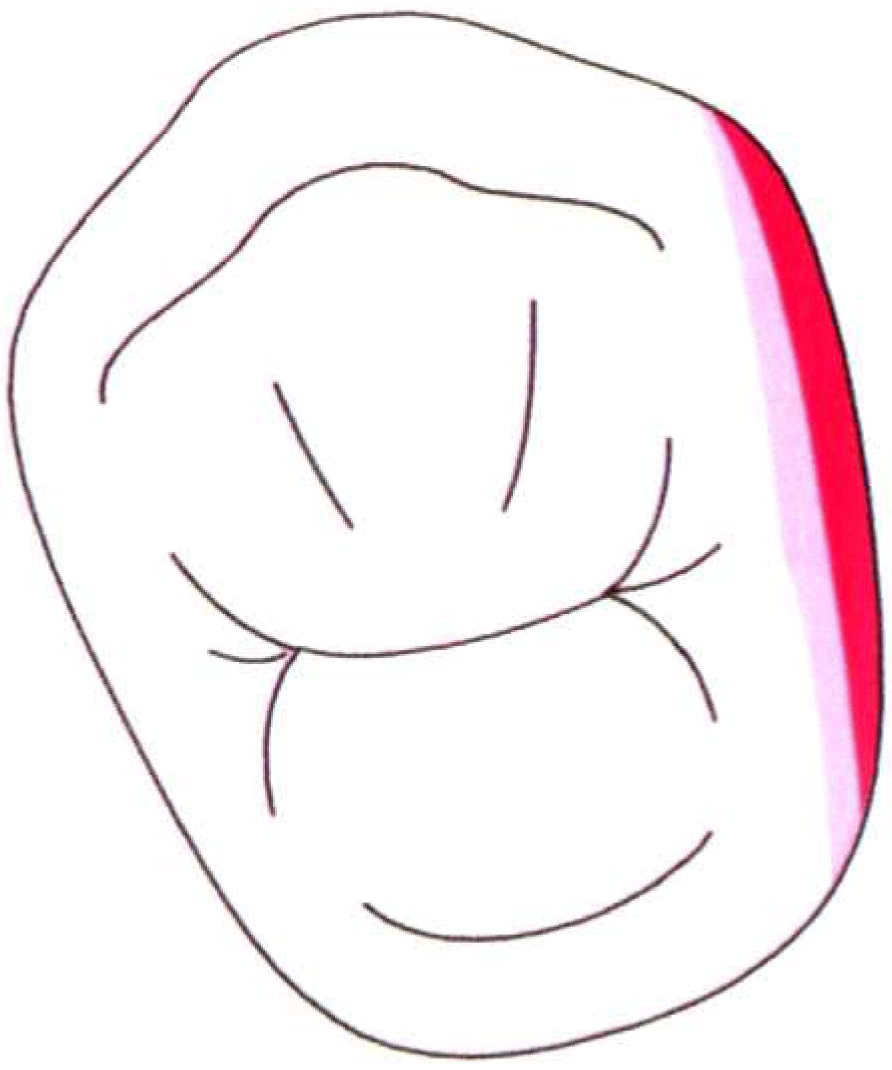


图 10-1　导平面应该是均匀地磨减牙体，并维持牙体外形（如红色所示），而不是磨成一个平面（如粉红色所示）

Fig 10-1　A guide surface should be prepared by even reduction of the surface of the tooth maintaining its contour (shown as red) and not as a flat surface (shown in pink)

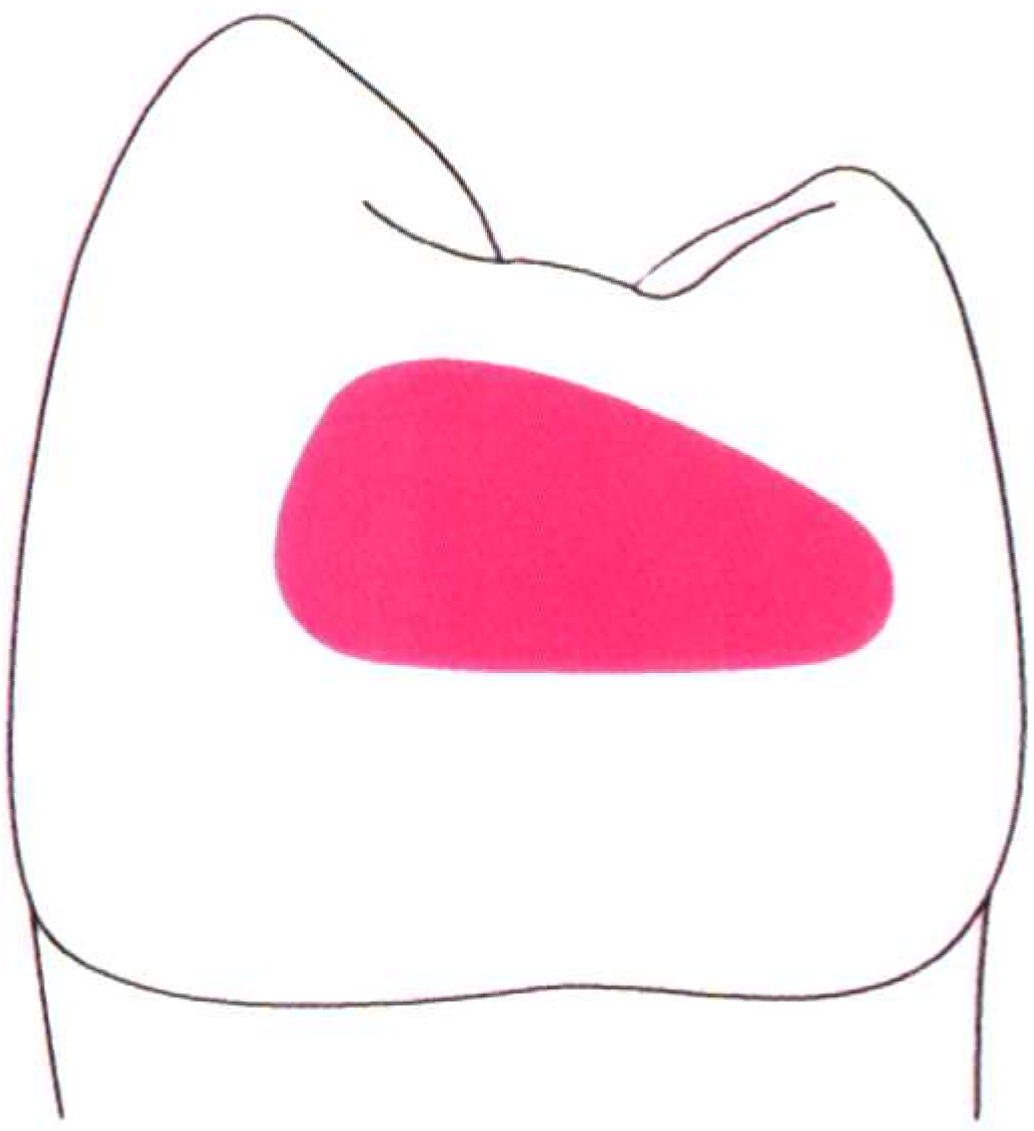


图 10-2　邻面导平面高 2～3mm，宽度大约等于颊舌尖距离。牙的自然外形使导平面形成朝向舌侧的锥面

Fig 10-2　A proximal guide surface should be 2—3 mm high and about as wide as the distance between the buccal and lingual cusps. The natural contour of the tooth results in a preparation that tapers towards the lingual surface

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在导平面的预备过程中，车针的角度决定导平面是否平行于就位道，应首先在研究模型上加以确定。在模型底座的唇侧和颊侧标出就位道会方便这个过程（图10-3）。这个角度能通过目测转移到口内，虽然或多或少有些不精确，但是这个简单的"目测"转移就位道到牙面的过程可以保证一两个导平面的平行，但对于多重预备却不太可能获得足够的精确。保持这一角度，车针沿着牙面进行制备，始终从龈向观察导平面，直到预备完成（图10-4）。重复这一过程以进行下一步预备。

During guide surface preparation the angulation of the bur required to produce a guide surface parallel to the intended path of insertion is first established on the study casts. Marking the path of insertion labially and buccally on the base of the cast will facilitate this procedure (Fig 10-3). This angulation of the bur is then transferred to the mouth by eye. Although somewhat imprecise, this simple process of "eye balling" the transfer of the path of insertion to the tooth surface can, with care, achieve reasonable parallelism for one or

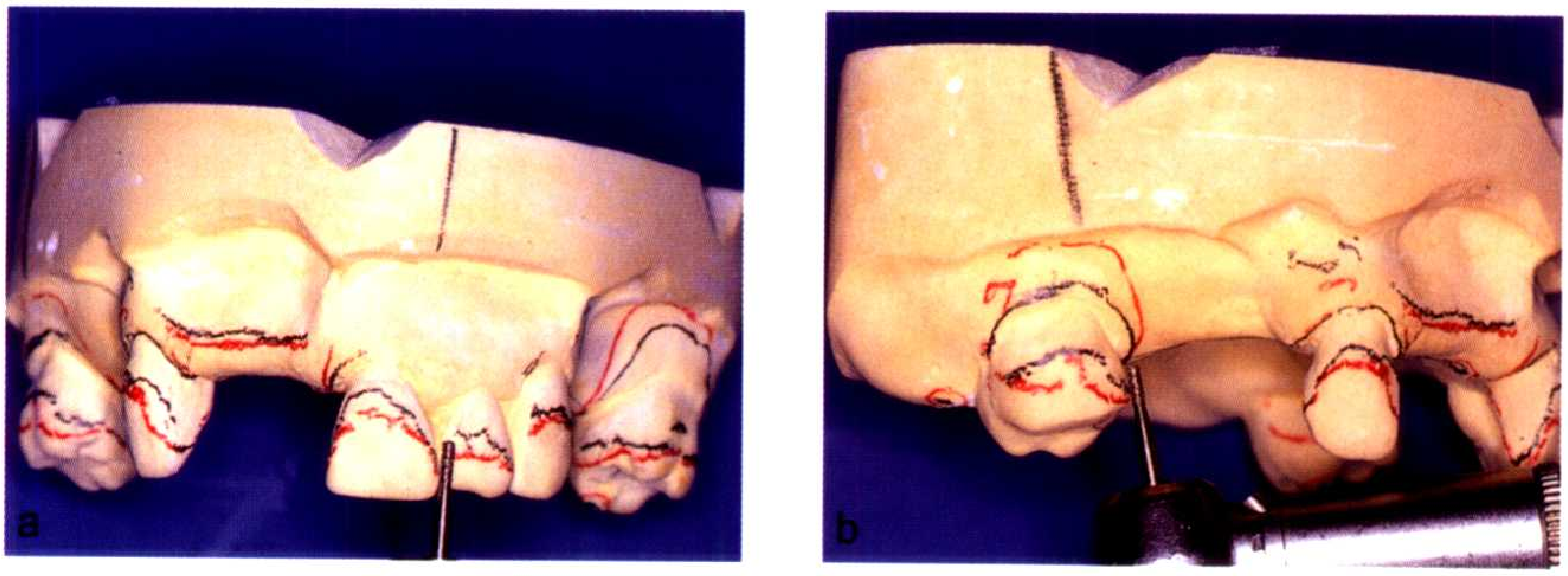


图 10-3　在观测研究模型时，核查车针与就位道的方向（看模型底座上的标记）

Fig 10-3 (a,b) Checking the orientation of the bur to the path of insertion on the surveyed study cast. (See marks on the base of the casts.)

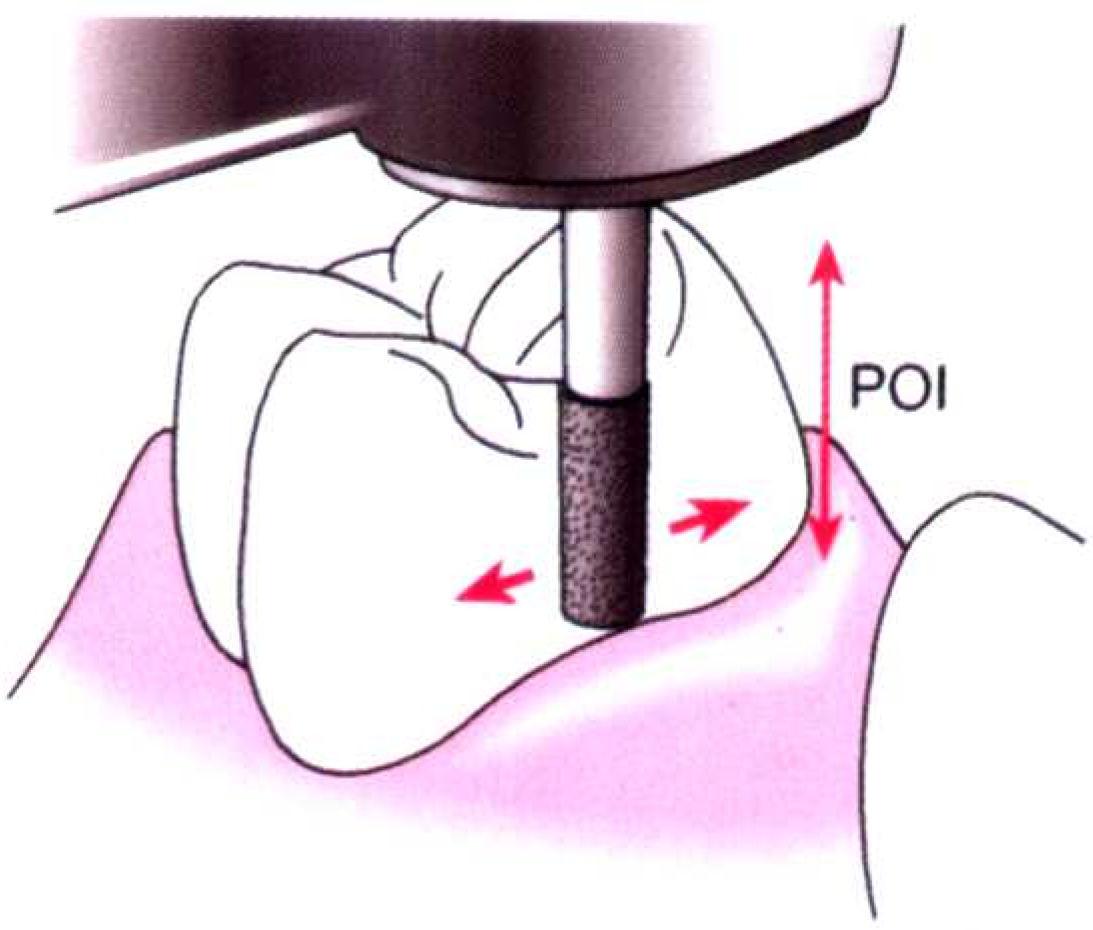


图 10-4　确立了正确的方向后，圆柱形金刚砂车针在牙齿的表面来回移动（POI，与位道）

Fig 10-4　Having established the correct orientation, the cylindrical diamond bur is moved back and forth around the involved surface of the tooth. (POI, path of insertion.)

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two guide surface preparations but is unlikely to result in sufficient accuracy for multiple preparations. Maintaining this angulation, the bur is guided around the tooth surface, all the while observing the guiding surface developing in a gingival direction, until preparation is complete (Fig 10-4). To prepare further guide surfaces the procedure is repeated.

降低观测线

通过减少牙体突度来降低观测线是一个简单而可靠的技术，这一技术能改善卡环的放置，通过允许：

- 圈卡卡环臂的起始处很好地放在殆平面以下
- 卡环固位臂尖端放置在牙冠的龈1/3，从而提供更好的美观和机械功能
- 一个对抗臂放置在外形高点以上，殆平面以下

降低观测线时，初始预备采用和预备导平面同样的圆柱形车针，其方向是通过目测，参考研究模型上的就位道。在确定了正确的角度以后，将车针放置在要预备釉质的表面，然后手机头轻轻地朝牙长轴倾斜，保持这个新的角度，磨除牙表面的釉质，直到预备的龈方部分达到预定的位置——形

Lowering survey lines

Lowering survey lines by the reduction of tooth bulbosity is a simple and reliable technique that can improve clasp placement by allowing:

- the origin of a circumferential clasp arm to be placed well below the occlusal surface
- the retentive clasp tip to be placed in the gingival third of the crown, providing better mechanical function and aesthetics
- a reciprocal arm to be placed on and above the height of contour well below the occlusal surface.

When lowering survey lines, the initial preparation is made with the same cylindrical bur used for the preparation of the guide surfaces. Alignment is by eyeballing with reference to the intended path of insertion on the study casts. Having established the correct angulation, the bur is positioned alongside the enamel surface to

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成新的、降低的观测线（图 10-5）。

be prepared. The head of the handpiece is then tipped slightly towards the long axis of the tooth. Maintaining this new angulation, enamel is removed from the involved tooth surface until the gingival part of the preparation occupies the desired position – the new, lowered survey line (Fig 10-5).

扩大外展隙

用一个细的、锥形金刚砂车针来扩大舌侧外展隙（图 10-6）。重塑的外形应该圆滑地连接舌面和邻面。

Embrasure widening

This is achieved by enlarging the lingual embrasure with a narrow tapered diamond bur (Fig 10-6). The re-contouring should blend smoothly with the lingual and proximal surfaces.

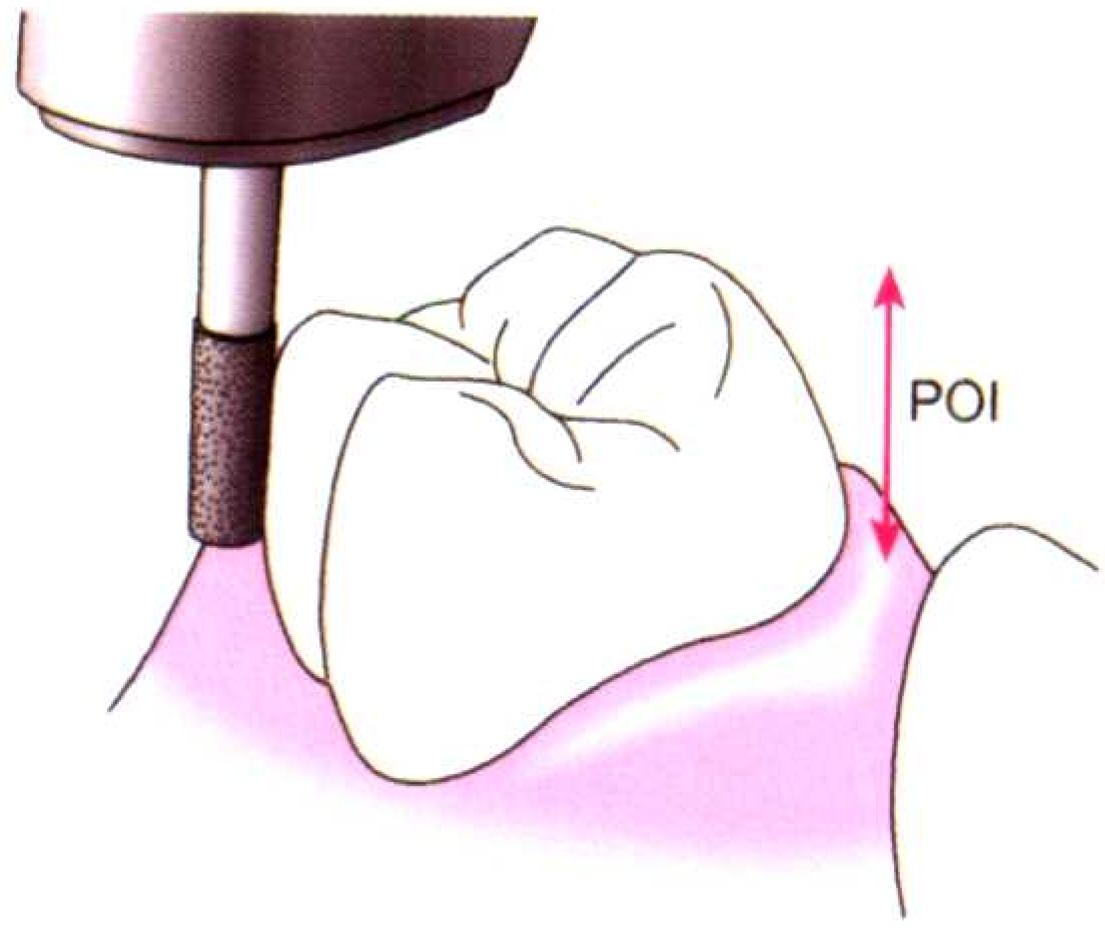


图 10-5 降低观测线：使车针沿着就位道的方向(POI)，放置在要磨除的牙体表面，手机的机头向牙齿中心微微倾斜，通过车针来回移动降低观测线

Fig 10-5 Lowering survey lines: having orientated the bur along the path of insertion (POI), the bur is placed against the involved surface, the head of the handpiece is tipped slightly towards the centre of the tooth and the survey line lowered by moving the bur back and forth

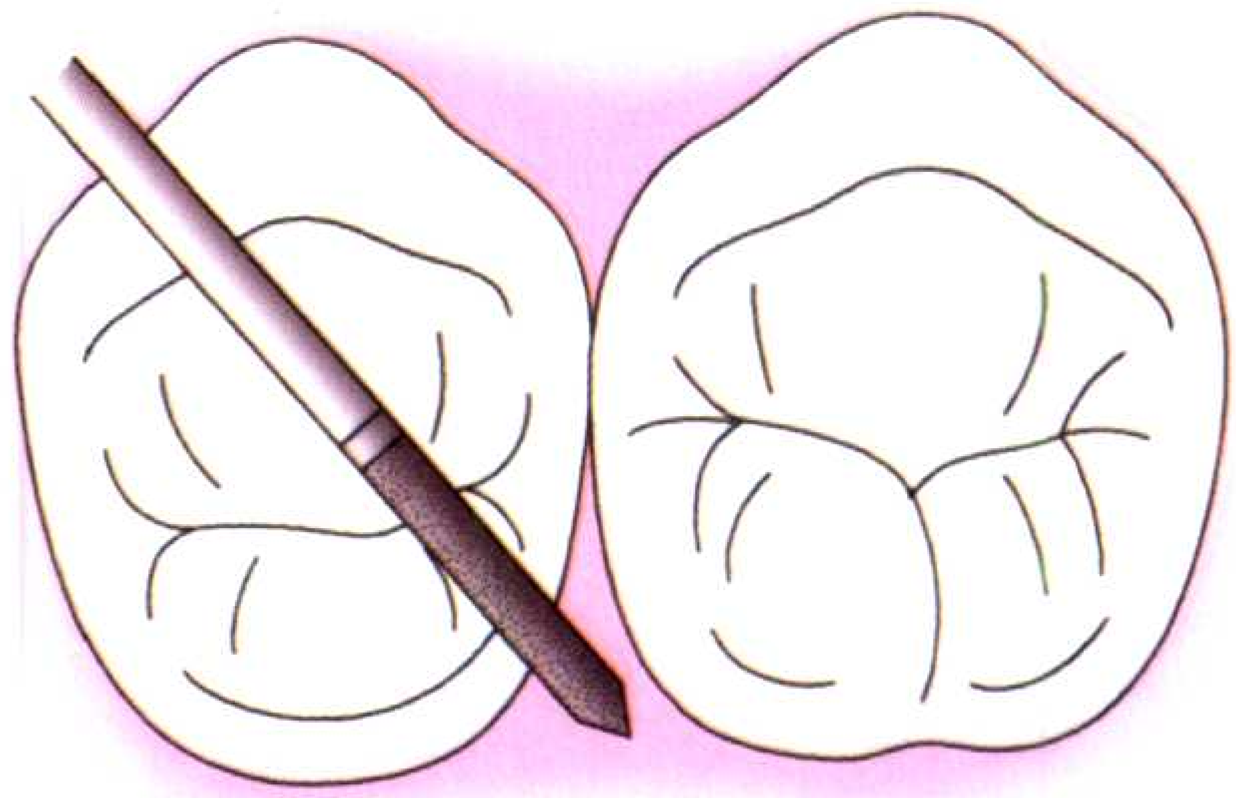


图 10-6 扩大邻间区

Fig 10-6 Enlarging the interproximal area

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预备支托凹

预备支托凹是为了给坚硬的殆支托提供空间，使之不干扰殆关系，此外，完成预备后的支托凹应该让支托可以主动就位（见殆支托），而且外形圆钝，从而使支托在行使功能时能有一定的动度。这可以通过磨减牙体，同时保存其原始外形来获得。

需要通过在殆接触状态下观察研究模型，来确定支托凹的正确设计和位置。如果可能，舌隆突支托应该放置在与对颌牙接触区的根方，支托凹必须有足够深度使对颌牙尖不会与完成后的支托早接触。这个深度会随着天然牙的殆接触情况而改变，但一般原则是它必须不少于1mm，以确保支托足够的强度。当快速检查是否有足够的牙釉质量被磨除时，可以要求患者轻轻地咬住烤软的基托蜡条，在预备区的蜡型厚度就会很好地显示是否预备出了足够的空间。

Rest seat preparation

Rest seat preparations aim to provide space for a rigid rest that does not interfere with the occlusion. In addition, the shape of the completed preparation should provide positive seating for the rest (see Occlusal rests) and should be rounded to allow some movement of the rest in function. These objectives are achieved by tooth reduction which maintains the original contour of the tooth surface.

The correct design and positioning of rest seats requires that the study casts be observed in occlusion. If possible, cingulum rests should be placed apical to the areas of contact with the opposing teeth and occlusal rest seat preparations must be sufficiently deep so that the opposing cusps do not meet the finished rest prematurely. The depth of this reduction will vary with the nature of occlusal contacts but as a general guide it should be at least 1 mm thick to ensure adequate strength of the rest. As a quick check that sufficient enamel has been removed, patients can be asked gently to close together on a strip of softened baseplate wax; the thickness of the wax in the region of the preparation will give a good indication as to whether adequate clearance has been made.

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殆支托

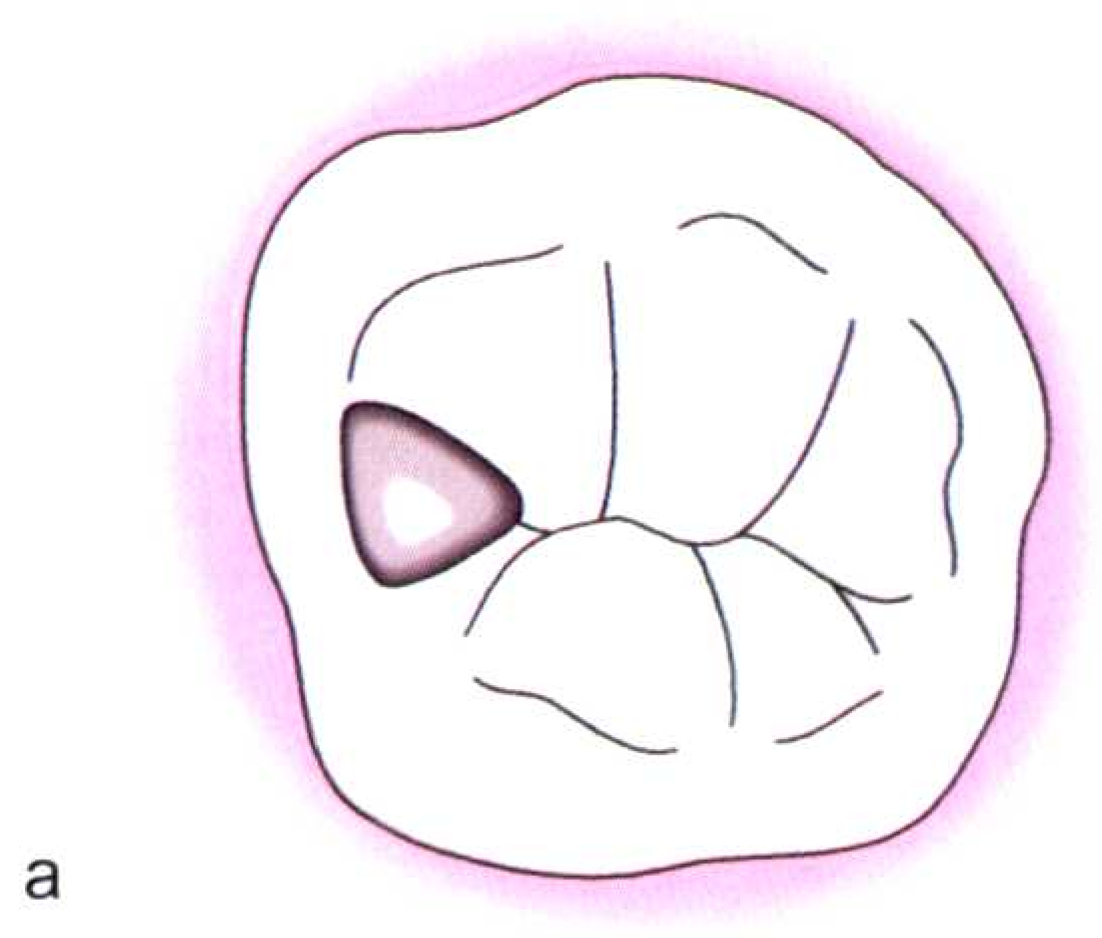
预备完成的后牙殆支托凹轮廓呈汤匙状，最宽处在边缘嵴，向牙中部逐渐变窄，通过磨减但仍保持牙体外形，支托的最深部分会在边缘嵴处与牙体邻面形成一个小于 90° 的角，从而可以确保主动就位（图 10-7）。

开始牙体预备时，首先是用一个型号合适的球形金刚砂车针（磨牙用6号，前磨牙用 4 号），削减并磨圆边缘嵴的中1/3处，然后，通过加深相邻的窝与磨除的边缘嵴融为一体。一旦完成预备，必须进行检查以确保对已经形成的就位道没有干扰，而且必须磨光滑任何细小的釉质边缘。

Occlusal rests

The outline of the completed occlusal rest seat preparation used for posterior teeth resembles a saucered spoon broadest at the marginal ridge and tapering in towards the centre of the tooth. By maintaining but reducing the existing contour of the tooth, the deepest part of the rest will form an angle of less then 90° with the proximal surface of the tooth at the marginal ridge and will thus ensure positive seating (Fig 10-7).

The preparation is started by first reducing and rounding the middle third of the marginal ridge using a round diamond bur of an appropriate size (no. 6 for molars, no. 4 for premolars) (Fig 10-8). This is followed by deepening of the adjacent fossa which is then blended into the reduced marginal ridge. Once complete, the preparation



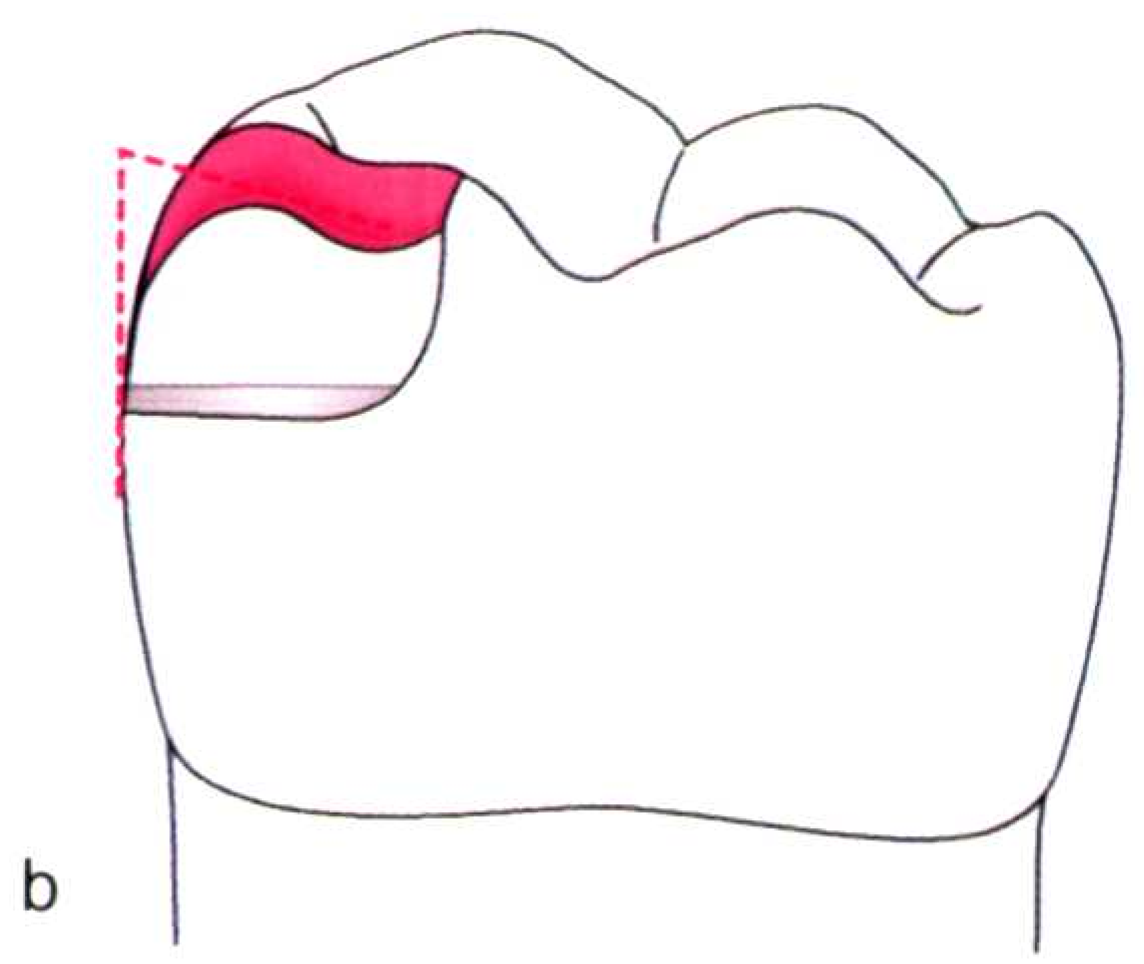


图 10-7 殆支托凹的预备：a. 殆面外形；b. 殆支托凹的剖面观，显示如何降低现有的牙体外形以保证支托主动就位

Fig 10-7 The occlusal rest seat preparation: (a) occlusal outline (b) sectional view of occlusal rest seat to show how lowering the existing contour of the tooth ensures positive seating of the rest

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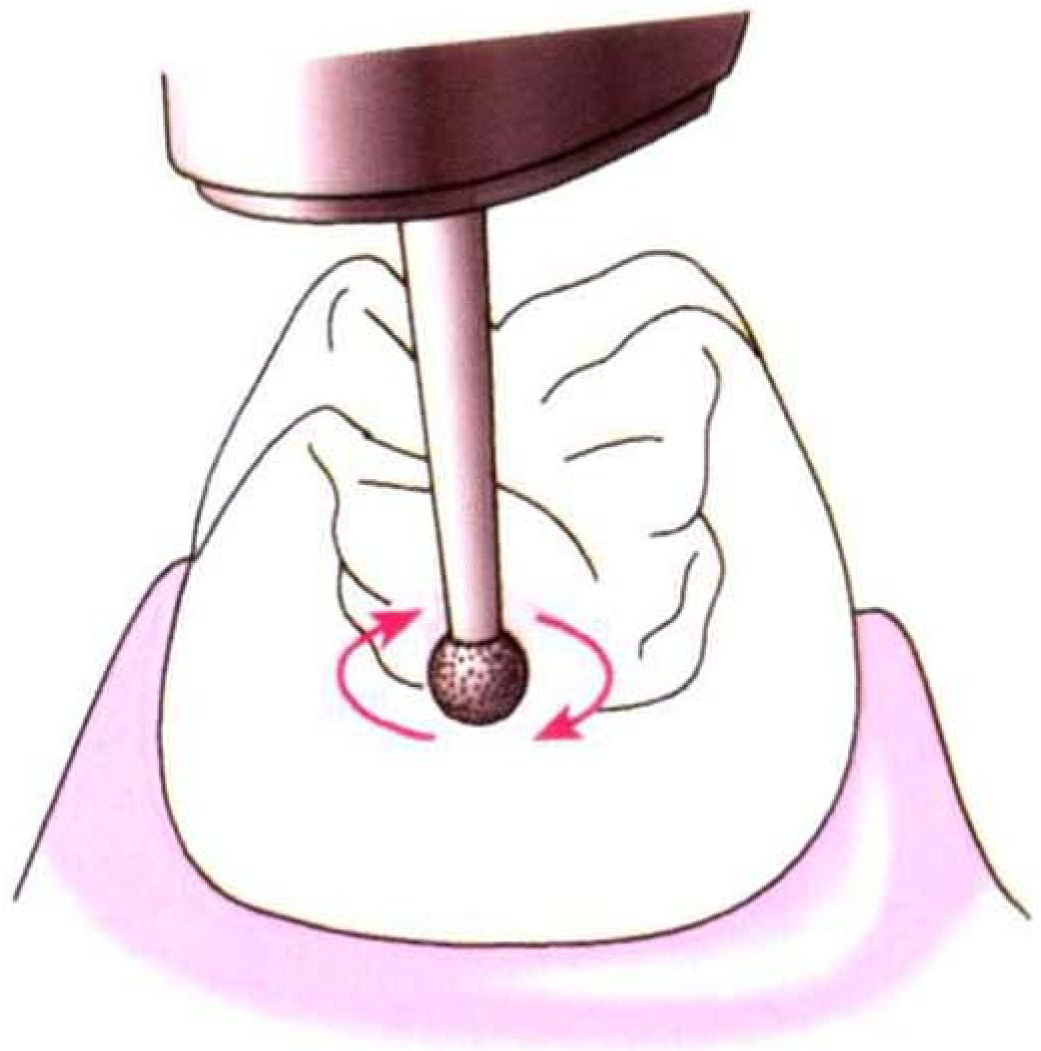


图10-8 通过削减和磨圆边缘嵴的1/3来开始殆支托凹的预备

Fig 10-8 Occlusal rest seat preparation is begun by reducing and rounding the middle third of the marginal ridge

should be examined to ensure that no interferences to the path of insertion have been created and any small enamel "lips" should be smoothed.

舌隆突支托

舌隆突支托的主动就位是通过在舌隆突上方的釉质内预备一个圆钝的沟（图10-9a）。这个预备最常用于上前牙，尤其是尖牙，因为尖牙的舌隆突发育充分，允许有足够的牙体预备而釉质只是适度地减少。沿牙体长轴方向放置合适的高速金刚砂球钻（2号），然后将角度稍稍朝向牙体中心，将转动车针向上横着提拉，正好在舌隆突的切方形成圆形的沟（图10-9b）。车针的角度形成了最朝向牙体中心的沟，从而确保支托的主动就位。支托在邻面连接到支架上，沟在这里应该加宽，以保证有足够的强度。预备经常会导致在支托凹的切端形成釉质边缘，应该将其磨圆滑，与余留的舌面外形连在一起。

Cingulum rests

Positive seating for a cingulum rest is created by preparing a rounded groove within enamel just above the cingulum (Fig 10-9a). This preparation is most frequently used on upper anterior teeth and, in particular, canines in which the cingulum is often sufficiently developed to allow an adequate preparation with only modest reduction of enamel. A suitable round high speed diamond bur (no. 2) is aligned with the long axis of the tooth and then angled slightly towards the centre of the tooth. A rounded groove is created by passing the rotating bur up and over and just incisal to the cingulum (Fig 10-9b). The angulation of the bur results in a groove that is deepest towards the centre of the tooth thus en-

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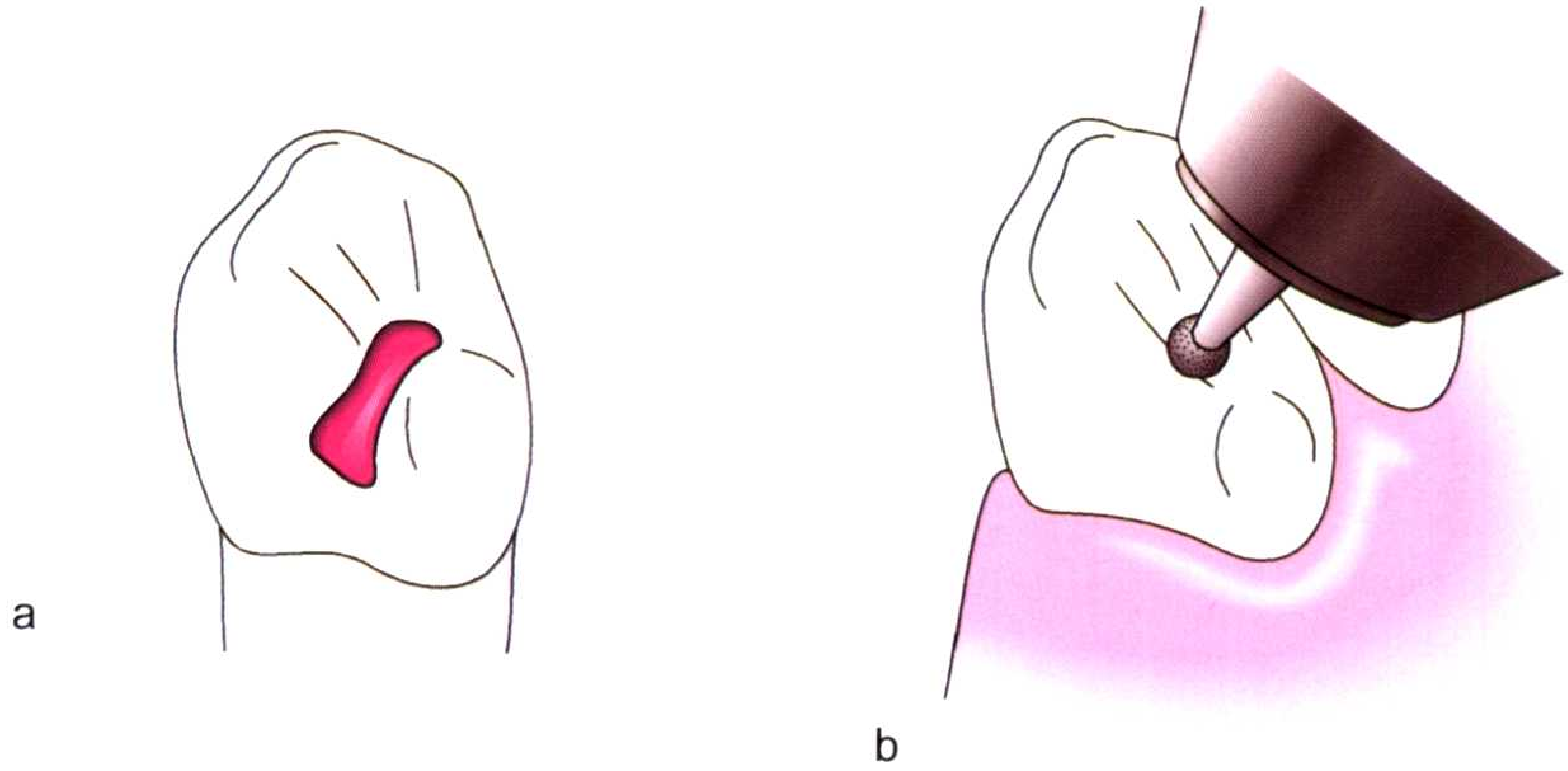


图 10-9　a. 预备后的舌隆突支托呈半月形；b. 车针正好位于舌隆突的切方，角度朝向牙体的中心

Fig 10-9 (a) Semilunar outline of prepared cingulum rest, (b) Bur positioned just incisal to the cingulum and angled towards the centre of the tooth

suring a positive seating for the rest. The groove should broaden proximally where the rest joins the framework to ensure adequate strength at this point. Preparation frequently results in a lip of enamel incisal to the rest seat preparation. This lip should be blended into the remaining lingual contour.

切支托

下颌前牙的舌面常见陡峭垂直的坡度以及发育不良的舌隆突，不磨穿牙釉质很难在这样的舌隆突上预备支托凹。此时，可以采用粘结复合树脂增大舌隆突或应用切支托。切支托的主要缺点是由于不可避免的切嵴金属暴露而导致外观不良。然而，如果注意支托的位置以及支架的制作，可以尽可

Incisal rests

The steep vertical slope and poorly developed cingulum often seen on the lingual surface of lower anterior teeth prevents the preparation of cingulum rest seats without penetration of enamel. This may be overcome either by the augmentation of the cingulum by bonded composite additions or with an incisal rest. The major disadvan-

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能地减小这个美观问题。

tage of the incisal rest is a poor appearance resulting from the inevitable display of metal at the incisal edge. However, with care both in the site of the rest and the fabrication of the framework these aesthetic problems can be minimised.

首先采用火焰状金刚砂车针在切嵴处做一个槽口，槽口位于距近中或远中切角1～2mm处，向舌面倾斜，并尽可能少地向唇面延伸。槽口应该融入舌面外形，形成唇向斜面（图10-10）。

Initial preparation consists of a notch cut into the incisal edge using a flame shaped diamond bur. This notch should be positioned 1–2 mm. in from the mesial or distal incisal corner and should slope towards the lingual in an attempt to keep extension on to the labial surface to a minimum. The notch should be blended into the lingual surface contour and bevelled labially (Fig 10-10).

创造卡环倒凹

创造卡环固位倒凹的最简单的方法是在桥基牙表面添加粘结复合树脂（图10-11）。这是基于桥基牙有足够数量和质量的牙釉质来保证充分的粘结，

Creation of clasp undercut

The simplest method of creating a retentive undercut for a clasp is with an adhesive composite addition to the involved tooth surface (Fig 10-11). This assumes that



图10-10　切支托凹的预备：槽口位于距近中或远中切角1～2mm处，车针向舌面倾斜，尽可能少地向唇面延伸

Fig 10-10 Incisal rest seat preparation: the notch is prepared 1—2 mm in from the mesial or distal incisal corner and the bur should be angled towards the lingual in an attempt to keep extension on to the labial surface to a minimum

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以及桥基牙的外形和位置允许毋须太多体积的复合树脂就可以产生倒凹。复合树脂的位置是通过观测研究模型，参考临床上的需要来决定的。特殊的超细前牙复合树脂材料能够提供更好的色泽匹配，并且可能减少对卡环臂的磨耗，尽管证据表明卡环磨耗并不是一个很重要的问题。

there is a sufficient quantity and quality of enamel to ensure an adequate bond and that the position and morphology of the tooth allows the creation of undercut without an unreasonable bulk of the composite addition. The positioning of the composite addition is determined from the survey of the study casts reference to which should be made during the clinical procedure. Specific ultrafme anterior composite materials offer greater flexibility in shade matching and may reduce the potential for abrasion of the clasp arm by the composite though

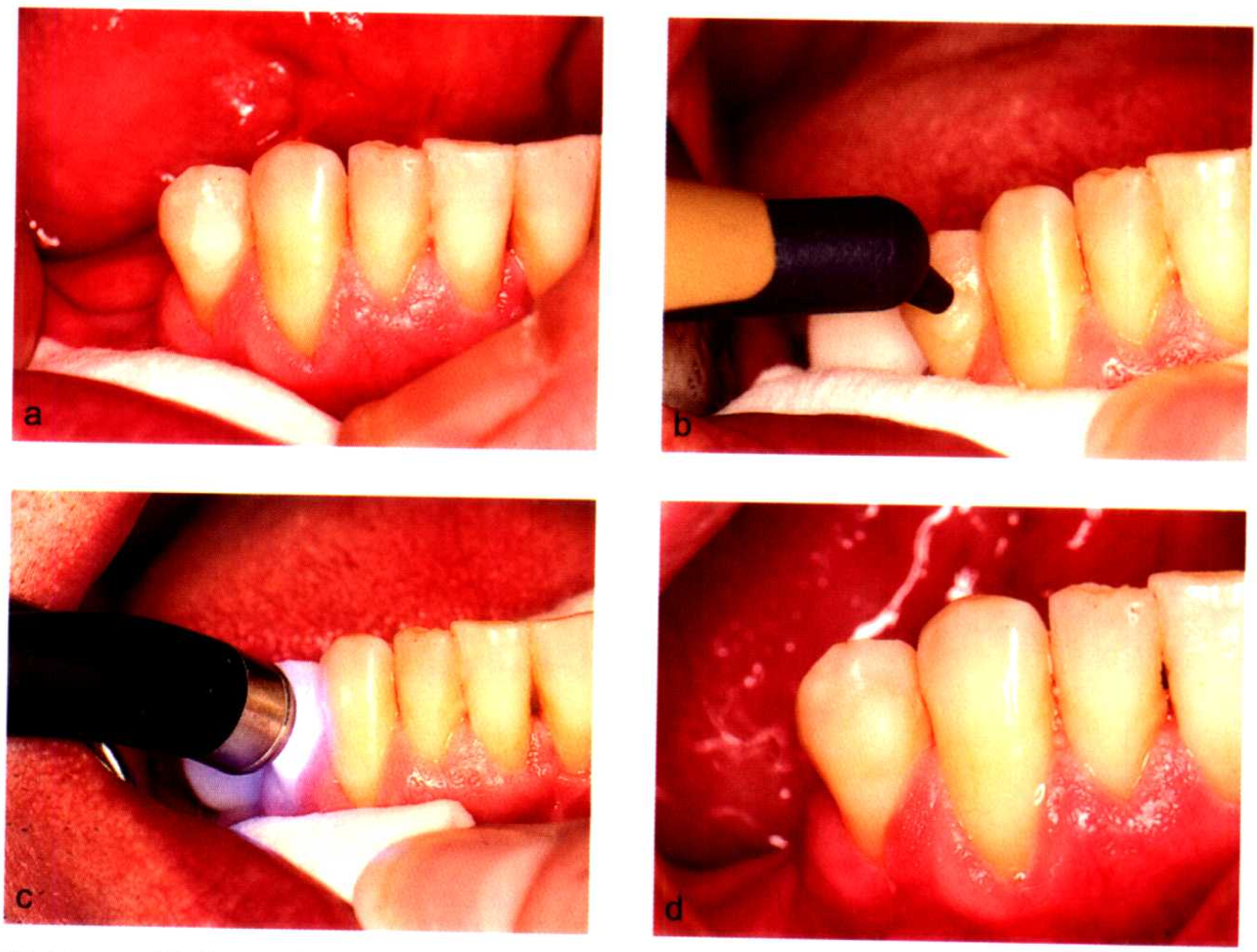


图 10-11　用酸蚀固位的复合树脂在4|的近中颊侧制备倒凹

Fig 10-11 (a-d) Use of etch-retained composite to create undercut on the mesiobuc-cal surface of LR4

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evidence does suggest that this is not a significant problem.

当怀疑所需要的牙体外形修整还不够满意时，可以用藻酸盐材料取印模，灌注快干石膏模型，观测新模型就能很快确定预备是否足够。

Where doubt exists that the required tooth modification have not been satisfactorarily achieved, an alginate impression can be taken and cast in quick-setting plaster. Surveing this new model will quickly confirm whether or not the preparations are adequate.

所有对健康牙体组织的预备和重新塑型都应该在牙釉质中完成，预备后的表面应该光滑，圆钝，用粗糙度逐渐变细的砂石和橡皮轮连续抛光。虽然没有什么证据表明预备后的牙齿龋坏发病率增加，但是许多临床医师还是建议对抛光后的牙齿应用氟凝胶或者底漆。如果同时还要取终印模，则应该在取完印模后再应用氟。

All preparation and re-contouring of sound tooth tissue should be completed in enamel. Prepared surfaces should be smoothed, rounded and polished with stones and rubber polishing points of successively reducing coarseness. Although there is little evidence of an increased caries incidence of prepared teeth, many clinicians recommend that fluoride gel or varnish should then be applied to the polished tooth contours. When the final impression is to be made at the same appointment, the application of fluoride should be delayed until the impression has been taken.

牙体预备的常见错误

Common errors during tooth preparation

- 没有或无效的牙体预备，尤其是涉及殆向式卡环臂的尖端（高观测线）以及卡环经过邻间隙的地方（邻间隙扩大）。
- No or ineffective tooth preparations particularly in relation to the origin of occlusally approaching clasp arms (high survey lines) and where components pass interproximally (embrasure widening).
- 对殆关系注意不够。
- Insufficient attention to the occlusion.

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对桥基牙做冠修复

如前面所提及的，对桥基牙做冠修复提供了一个创造牙冠外形的机会，可以完成所有对固位和支持的要求，并且提供良好的导平面和对抗面（图 10-12）。其适应证如下：

- 需要冠覆盖来获得足够的修复
- 计划对𬌗平面水平做明显的改变
- 需要减少严重的干扰或倒凹

当打算进行多个冠或固定活动联合修复时，早期规划义齿的设计是很重要的。要观测研究模型，并在冠预备之前确定义齿的设计。只有通过明确义齿的设计，尤其是它的就位道，相关的设计特点才能被成功地、可预测地整合进冠内。

Crowning Abutment Teeth

As previously mentioned, crowning of abutment teeth offers the opportunity to create a coronal shape that fulfils all of the requirements of retention and support and provides perfect guiding and reciprocal surfaces (Fig 10-12). Crowning of abutment teeth is indicated when:

- adequate restoration requires coronal coverage
- significant changes to the level of the occlusal plane are planned
- reduction of severe interferences or undercut is required.

Early planning of denture design is essential when multiple crowns or the combined use of fixed and removable prosthesis is intended. Study casts should be surveyed and the denture design established before crown preparation is undertaken. It is only through an awareness of the design of the planned denture and, in particular, its path of insertion that relevant design



图 10-12　桥基牙冠融合了导平面和支托，在磨牙腭侧还有研磨的台肩用于放置卡环的对抗臂（感谢 D. Barker 先生）

Fig 10-12 Crown abutments incorporating guide surfaces, rests and milled palatal ledges for clasp reciprocal arms on the molar teeth. (Courtesy of Mr D. Barker.)

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由于可摘局部义齿，尤其是卡环，施加到冠修复桥基牙上的负荷，使得提高牙冠预备体的抗力型和固位型成为必要。这可以通过使用盒型、沟、钉固位型，以及牙冠延长术来获得。当需要在常规的牙冠外形上调磨更多的牙体组织以形成支托凹、导平面和放置卡环对抗臂的腭侧台肩时，固位型和抗力型可能进一步受影响。一般而言，利用桩冠做卡环固位的桥基牙时不能提供足够的固位，常常导致早期失败。

通常在可摘局部义齿取工作模型之前要制作好桥基牙牙冠并进行试戴。将研究模型上设计的就位道转移到要制作冠套的代型上时，需要用到观测模型时确定的转移三角，这就要求取桥基牙牙体预备后的全牙列印模。此外，在制作冠套之前，通常需要采用蜡殆堤来记录一个稳定的殆关系，使工作模型对好咬合。如果想继续使用现存义齿，就对预备桥基牙的暂时修复体有特殊的要求。显然，它们必须被设计成适合于现存的义齿，也必须抵抗正常使用和取戴义齿时的移位（图10-13）。

features can be successfully and predictably incorporated within the crown.

The loads applied by the partial .denture — in particular, the clasps — to the crowned abutment tooth necessitate improvements in the retentive and resistance form of the crown preparation. This is achieved by the inclusion of boxes, grooves and pins, and with crown lengthening procedures. Retention and resistance form may be further compromised by the need for additional tooth reduction to accommodate rest seats, guiding surfaces and palatal shoulders for reciprocal clasp arms within the usual coronal form. In general, post-retained crowns do not offer sufficient retention when used to restore clasped abutment teeth and are commonly subject to early failure.

It is usual to construct and fit crowns for abutment teeth before proceeding to the working impression for the partial denture. Transfer of the planned path of insertion from study cast to the die cast on which the crown is constructed is achieved using the transfer tripod points established during the surveying procedure. This reauires a full arch impression of the crown(s) preparation. In addition, the loss of teeth frequently requires an additional registration stage with wax occlusal rims for a stable jaw relationship record used to articulate working casts prior to crown

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图 10-13 在永久冠制作期间，6|6 上的临时冠适合现存的可摘局部义齿

Fig 10-13 Temporary crowns on UR6 and UL6 fabricated to accommodate an existing partial denture during construction of definitive crowns and a replacement partial denture

construction. The continued use of an existing partial denture during fabrication of crowns places particular requirements on the temporisation of prepared teeth. Clearly these must be designed to fit the existing denture but must also resist dislodge-ment during the normal use and removal of the denture (Fig 10-13).

制作适合现存可摘局部义齿的冠套

可能需要在已有可摘局部义齿的情况下来进行桥基牙的冠修复。目前有许多描述如何制作冠套、使之适合相关的义齿组件的技术。这里推荐的方法是应用一个在口内修改的转移顶盖，使之适合可摘局部义齿的表面（图 10-14）。

在实验室制作最后的蜡型期间，将所有必需的卡环倒凹都整合进去。

Construction of crowns to fit an existing partial denture

Crowning of an abutment tooth may be required in the presence of an existing partial denture. A number of techniques to construct the crown so that it fits associated components of the denture have been described. The recommended method involves the use of a transfer coping that is modified intraorally to adapt to the fitting surface of the partial denture (Fig 10-14).

Any necessary clasp undercut is incorporated during the final waxing of the crown in the laboratory.

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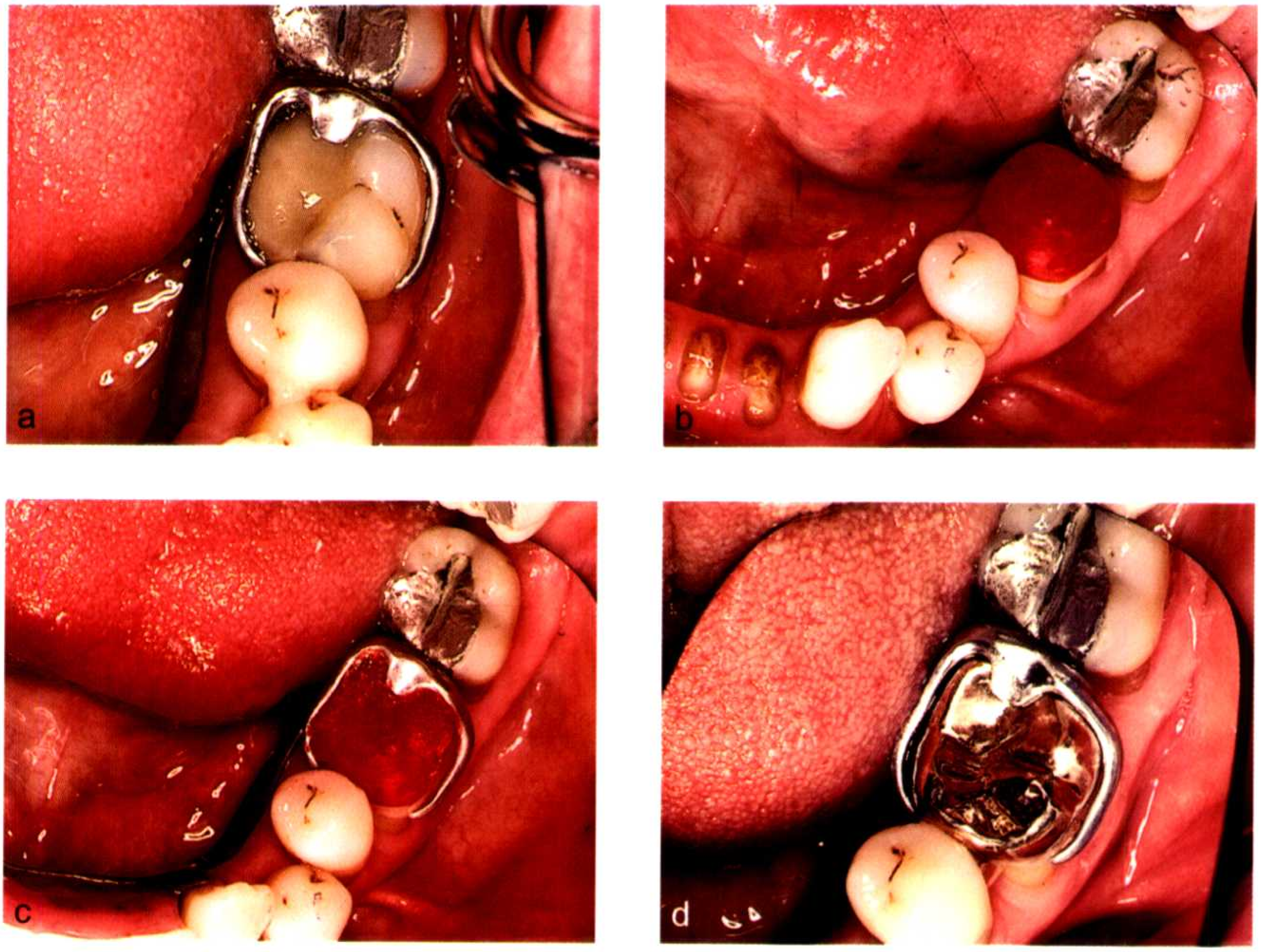


图 10-14 a. ⌈6 需要一个金全冠来适合现存的有功能的下颌义齿；b. 预备牙体上的转移可摘；c. 可摘局部义齿就位后，将顶盖塑形来记录相关部件接触面的细节；d. 完成的冠和可摘局部义齿

Fig 10-14 (a) LL6 requires restoration with a full veneer gold crown to fit an existing and functioning lower partial denture, (b) Transfer coping on the prepared tooth. (c) The partial denture has been seated and the coping built-up to record the detail of the fitting surface of related components, (d) The completed crown and partial denture

重 点

- 通常可摘局部义齿的牙体制备包括预备导平面和支托凹、降低观测线以及为卡环创造固位倒凹。
- 牙体预备最通常是应用简单的牙体修形，不提倡常规使用桥基

Key Points

- Commonly required tooth modifications for partial dentures include the preparation of guide surfaces and rest seats, lowering survey lines and the creation of retentive undercut for clasps.
- Tooth preparations are most frequently carried out by simple tooth reshaping.

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牙冠修复来获得理想的牙冠外形。

- 如果牙体需要大面积修复或者是重度磨耗，在桥基牙上做冠套是必要的。这将提供一个理想的机会，以整合任何所需的支托凹、固位倒凹或导平面。只有在冠预备之前，已经明确了就位道的方向和最后的义齿设计，才可能达到所期望的效果。

The routine crowning of abutment teeth to achieve an ideal crown shape is not advised.

- Crowning of abutment tooth may be necessary if the tooth is heavily restored or worn. This will provide an ideal opportunity to incorporate any necessary rest seats, retentive undercut or guide surfaces within the crown. This may be predictably achieved only if the path of insertion and final denture design are established before crown preparation is undertaken.

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第11章 临床指导IV：可摘局部义齿的完成和维护

Clinical Guide IV: Completing and Maintaining the Partial Denture

目　的

本章描述了用于制作可摘局部义齿金属支架的工作印模，以及在支架上完成添加人工牙的临床步骤；同时强调了定期回访的必要性，以确定和调改义齿存在的问题并且维持余留牙齿的健康和义齿功能。

Aim

This chapter will describe the working impression used for the construction of the metal framework for a partial denture and the clinical stages required to complete the addition of replacement teeth to the framework. It will emphasise the need for scheduled reviews to identify and correct denture errors and to maintain oral health of remaining teeth and denture function.

要　点

阅读本章后，从业医师应该了解制取工作模型印模和改良模型印模的临床技巧，了解如何记录最终颌位关系，如何试戴可摘局部义齿以及常见的临床错误。此外，从业医师还应该认识到长期戴用可摘局部义齿时维护口腔卫生的重要性。

Outcome

After reading this chapter, the practitioner should be aware of the clinical techniques used for working and altered cast impressions, how to record the definitive jaw relationship and how to try-in and insert the partial denture and the common clinical errors. In addition, the practitioner should be able to recognise the importance of the maintenance of dental health for the long-term function of a partial denture.

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工作印模

这一步骤要达到的目标是：

- 制取一个工作印模。
- 完成义齿支架构造的技工室设计图。

任何预防性修复治疗和牙体调改都必须在制取工作印模之前完成。尽管可以使用坚硬、伸展良好或者修整过的成品托盘来制取工作印模，但使用在研究模型上制作的个别托盘可以便于工作印模来更精确地记录余留牙体组织和软组织的微细结构，并且可以控制印模材料的厚度（图 11-1）。只有当托盘的延伸区域有明显的缺陷或者面对较大的缺牙区时，才通常对托盘的周边进行修整。

Working Impressions

The objectives of this stage are to:

- record a working impression
- complete the laboratory prescription for the construction of the denture framework.

Any preparatory restorative treatment and tooth modifications must be completed before working impressions are recorded. Although rigid, well-extended or modified stock impression trays can be used for the working impression, use of a custom tray constructed on the study cast greatly facilitates the production of a working impression that accurately records the required detail of the remaining teeth and soft tissues and allows the use of a controlled

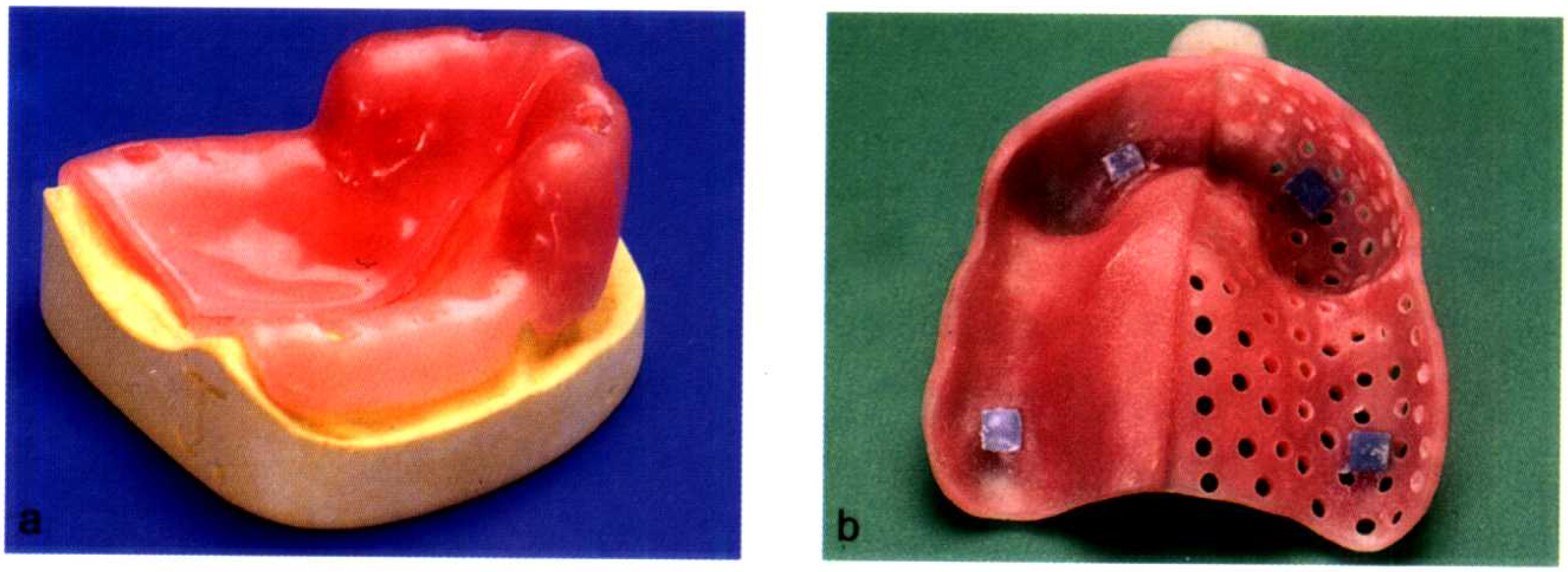


图 11-1　制作个别托盘。a. 铺蜡片控制硅橡胶或者藻酸盐印模材料的厚度；b. 完成后的个别托盘显示一侧为实心一侧为穿孔，分别用于盛装硅橡胶和藻酸盐印模材料，托盘支撑点确保了准确和有控制的托盘就位

Fig 11-1 Fabrication of custom trays, (a) Wax spacing to ensure a controlled thickness for elastomer and algmate impression materials, (b) The completed custom trays showing a solid and perforated finish for elastomer and alginate impression materials, respectively. Tray stops ensure the accurate and controlled seating of the impression tray

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这些情况通常反映初次印模不合适。不过，当要求获得前牙舌侧区的功能印模，如设计下颌大连接体时，在制取工作印模前对此区进行边缘整塑是必要的。

thickness of impression material (Fig 11-1). Modification to the periphery of the custom tray is normally only required when there are gross deficiencies at tray extension or its adaptation over large edentulous areas. Such errors normally reflect inadequacies of the preliminary impression. However, when the design of the lower major connector dictates a functional impression of the anterior lingual sulcus, border moulding in this area may be necessary before the working impression is made.

在许多有条件即刻灌注模型的地方，藻酸盐可以成为选择的印模材料。然而，在较大较深的倒凹区选用藻酸盐常常会导致印模的断裂或变形。面对这种情况下，或者30min内无法灌制工作模型时，推荐使用中等黏性的加成型硅橡胶。应该避免使用硬度更高的聚醚类硅橡胶，因为此类印模材料硬固后常常很难从患者口中取出，并且在从工作模型上分离时很容易导致石膏牙的折断。无论选择何种印模材料，都应该避免制取毋须记录的深倒凹区，这个问题可以通过减少个别托盘进入义齿不涉及的软组织倒凹区来解决。一个常见的例子就是没有前牙缺失的唇侧倒凹，在这种情况下托盘的延伸范围只要恰好盖过唇侧牙龈边缘就已经足够了。较大的楔状隙应该用软蜡片填充后再制取印模（图11-2）。

For many cases, and where facilities are immediately available to pour the working cast, alginate will be the impression material of choice. However, its use in the presence of large deep undercut areas frequently results in tearing and distortion of the impression. In such circumstances, and where the cast cannot be poured within 30 minutes, use of a medium-viscosity addition-cured silicone is recommended. More rigid polyether elastomeric impression material should be avoided as the set impression is often difficult to remove from the mouth and will almost certainly result in tooth fracture on removal from the major cast. Regardless of the choice of impression material, large undercut areas that do not need to be recorded should be avoided; this problem can be anticipated by reducing the extension of the custom tray into soft tissue undercut that is not involved in

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支 11-2　在制取印模前用蜡封闭较深的唇侧楔状隙

Fig 11-2　Deep embrasure spaces blocked out labially with wax prior to recording the impression

the denture design. A common example is the labial undercut where there are no anterior teeth to be replaced. In this case extension of the tray to just beyond the labial gingival margin is perfectly adequate. Large embrasure spaces should be "filled" with soft carding wax before recording the impression (Fig 11-2).

常见错误

- 初始印模导致的终印模缺陷（参见第 8 章），但更常见于托盘受力过大。
- 硬固后的印模材料不能够牢固地粘结在个别托盘上。
- 技工室设计单不完整，不清楚，这会让你自食其果！

Common errors

- Impression faults as for preliminary impressions (see Chapter 8), but particularly, overloading the impression of tray.
- Set impression material not firmly adherent to custom tray.
- Incomplete and unclear laboratory design prescription. You get back what you give!

试戴金属支架

这一步骤的目标是确保支架能够精确地就位，并且不干扰天然牙的殆

Try-in of the Metal Framework

The objective of this stage is to ensure that the framework fits accurately and does

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关系。

在口内试戴支架之前，先检查支架在工作模型上是否合适，并且符合预定的设计。临床的检查顺序是：支架的适合性，固位情况以及可能的殆干扰情况（图11-3）。

少量的调改对于确保支架顺利就位是必要的。要强调"少量"这一点，对于可以满意就位的支架花费很长时间来调改是不能获得什么回报的。只需要调改支架上指示剂显示的区域，不要调改基托的抛光边缘，因为这些区域位于观测线的殆方，它们不可能成为错误的来源，而且调改这些位置会导致支架和牙面间出现缝隙。在调改过程中，应时常把支架浸泡在冷水中，避免支架过热和形成氧化膜。

not interfere with the occlusion of the natural teeth.

Before trying the framework in the mouth, check that it fits the master cast and conforms to the prescribed design. Clinically, check the framework's fit, retention and possible occlusal interference, in that order (Fig 11-3).

Minor adjustments are sometimes necessary to ensure the proper seating of the framework. The word minor is stressed. A long period of time spent adjusting a framework is rarely rewarded by a framework that fits satisfactorily. It is important to adjust only those areas of the framework indicated by the disclosing medium. Do not adjust the finishing edges of plates. Since these are occlusal to the survey line they are unlikely to be the source of error and their adjustment will simply result in a space between the framework and tooth surface. During adjustment, dip the framework in cold water from time to time to

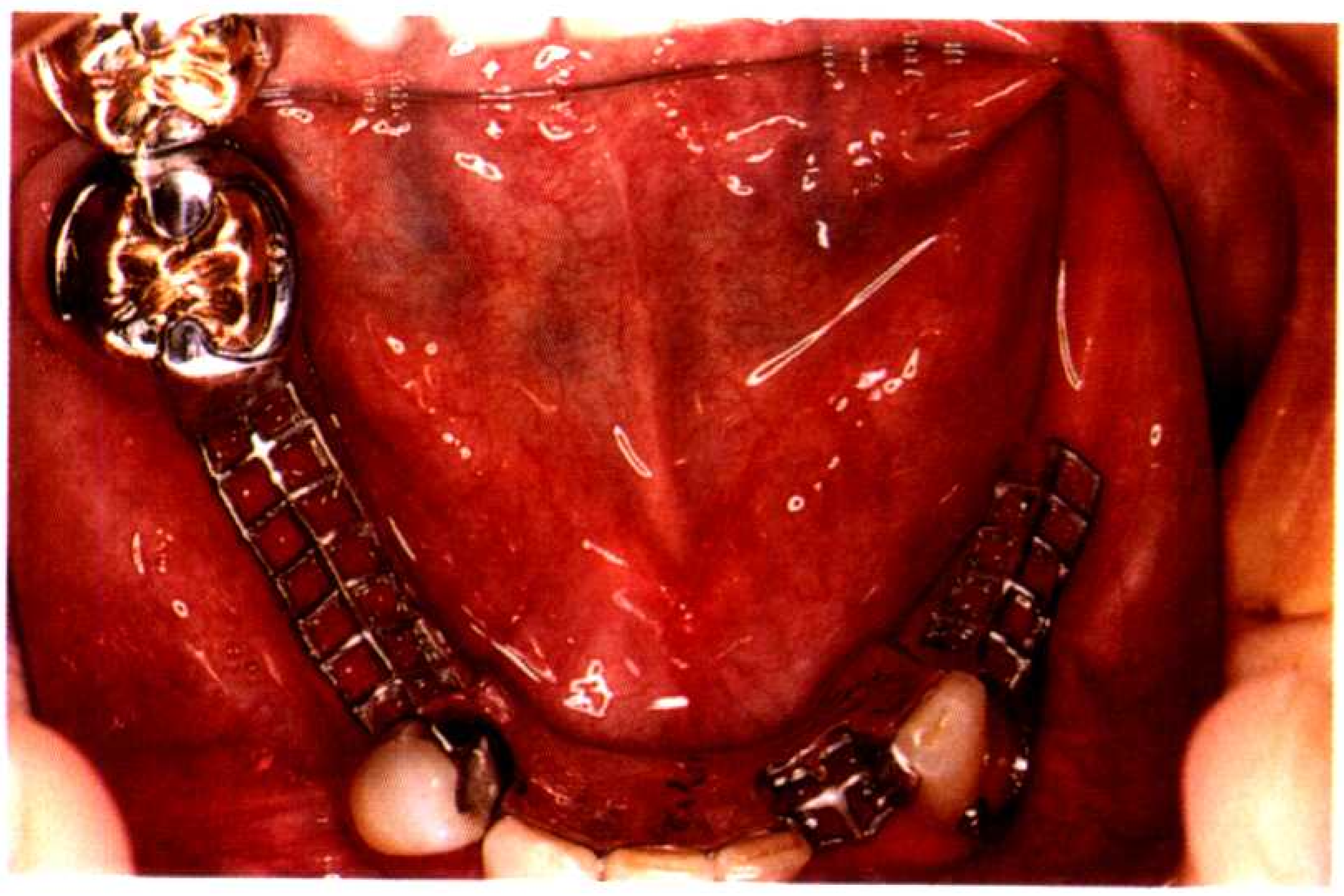


图 11-3 试戴支架

Fig 11-3 Framework try-in

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avoid overheating and the formation of oxide deposits.

当检查殆关系时，首先用咬合纸标记未戴支架前的牙尖接触区，待支架就位后，用另一种颜色的咬合纸再重复这一过程，两套咬合记录应该完全一致。当正常的牙尖接触可以被复制以后，采用薄垫片确认它们的存在，然后在侧方和前伸运动时重复上述步骤。当上下颌都要试戴支架时，先戴入一个支架按上述步骤操作，之后取出再戴入另一个支架重复这些步骤，最后再把上下颌的支架都戴入来检查殆关系。

When checking the occlusion, first mark the intercuspal contacts with articulating paper without the framework and then repeat the procedure with the framework seated, but with articulating paper of a different colour. The two sets of contact markings should coincide. When normal intercuspal contacts are reproduced, confirm their presence with shimstock. Repeat the procedure for lateral and protrusive movements. When fitting both upper and lower frameworks, carry out this procedure with one framework, remove it and repeat with the other framework. Finally check the occlusion again with both frameworks in place.

常见错误

- 对殆关系的关注不足。
- 没有检查到有界限鞍基支架的摆动。通常情况下，带缓冲的后牙游离端鞍基金属支架有前后摆动是可能的。

Common errors

- Insufficient attention paid to the occlusion.
- Failure to detect rocking of bounded saddle frameworks. Usually some anteroposterior rocking of a free-end saddle framework with spaced posterior meshwork is possible.

改良模型印模法（下颌游离端鞍基义齿）

本临床步骤的目标是记录这样一种状态下的无牙颌牙槽嵴印模：软组织表现为与它们在承受殆力载荷下同

Altered Cast Impression (Lower Free-end Saddle Dentures)

The objective of this clinical stage is to record an impression of the edentulous ridge such that the soft tissues are displaced

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样的移位状态——即无牙颌牙槽嵴的功能状态。用这副印模制作的义齿鞍基在就位后将推移软组织，使之在义齿承受殆力载荷的情况下不会出现进一步的位移。用这种方法可以克服游离端鞍基可摘局部义齿的差动移位问题。

in the same way as they will be under occlusal loads – the "functional" form of the edentulous ridge. The denture saddle made to this impression will then displace the tissues when seated and no further displacement or movement of the denture base can occur under occlusal loading. This overcomes the problem of differential displacement of the free-end saddle partial denture.

最通常的做法是首先确保义齿支架试戴合适，然后连接一个紧密贴合的临时游离端鞍基基托，在基托内面来记录无牙颌牙槽嵴的印模（图11-4）。临时基托可能需要调改以确保后牙树脂鞍基的正确舌面延伸，这步操作最好使用绿色棒状印模膏，基托颊侧很少需要调改。

The most common method is to ensure the fit of the denture framework first and then attach a close-fitting temporary free-end saddle base(s) within which the impression of the edentulous ridge is recorded (Fig 11-4). Modification of the temporary base may be required to ensure the correct posterior lingual extension of the saddle acrylic and this is best achieved using green stick compound. Modification is rarely required buccally.

可以使用不同的印模材料来获得同样的结果：包括氧化锌－丁香油印模糊剂，轻质硅橡胶以及印模蜡，其中氧化锌－丁香油印模糊剂是最方便的。使用氧化锌糊剂时，在材料尚未硬固之前要去除进入桥基牙远中倒凹区的多余印模材料。重要的是应该完全依靠印模材料来获得组织的移位，就位压力只是施加在有牙体支持的支架上，而不应该直接施加在鞍基上。这也确保了支架的充分就位，而且在制取印模时支架仍能就位于原位。完成印模后应该修剪去多余的印模材料，然后

A variety of impression materials can be used to produce equally acceptable results. These include zinc oxide-eugenol impression paste, light-bodied elastomers and impression waxes although the first is perhaps the most convenient. When zinc oxide-eugenol impression paste is used, it is helpful to remove excess impression material from undercuts distal to the abutment teeth before it is set. It is important to rely wholly on the impression material to achieve tissue displacement and seating pressure should only be applied to that part

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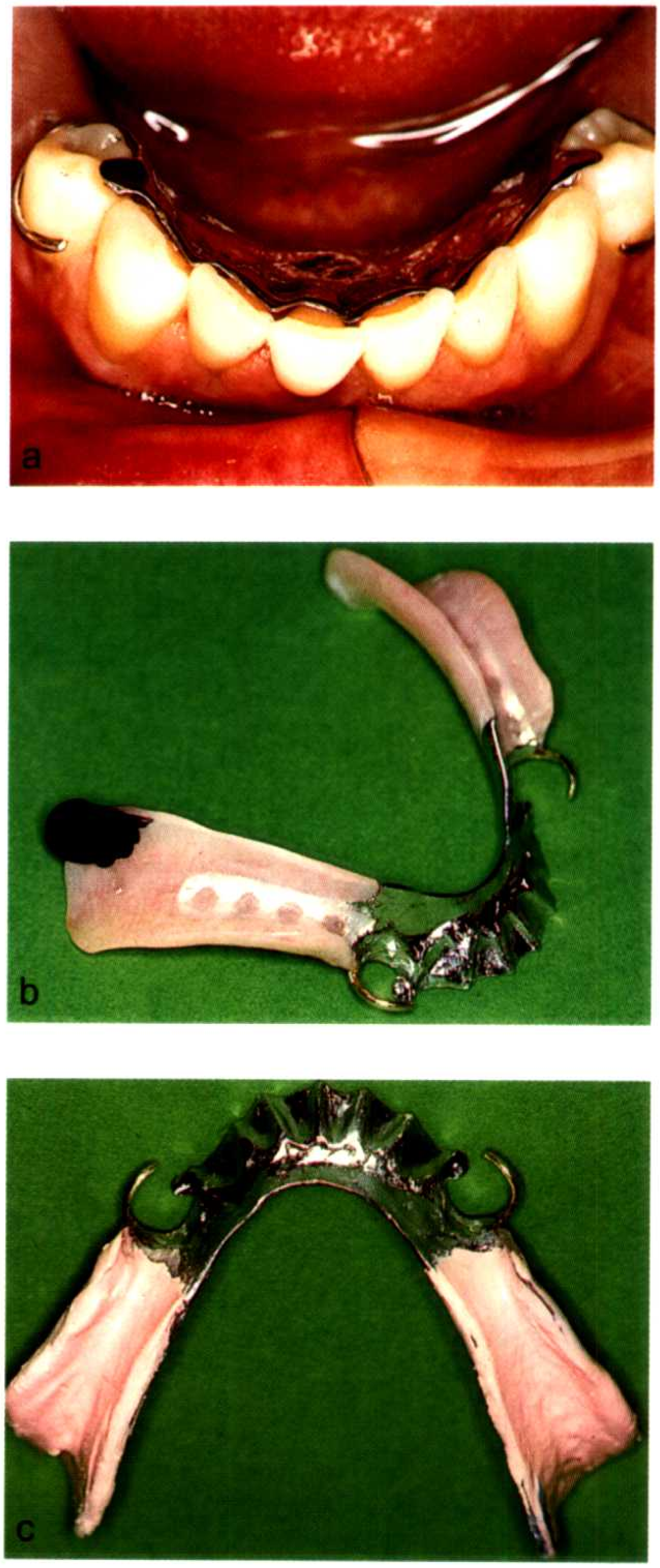


图 11-4　改良模型印模法：a. 连接紧密贴合鞍基的支架已经就位，在鞍基上施加一定压力，鞍基的移位导致连接体上升离开前牙舌面，如果不出现这种结果，而且鞍基延伸范围是可以接受的，那么就不必选择改良模型印模法；b. 在后牙舌侧区用绿色棒状印模膏进行调改；c. 用氧化锌丁香油印模糊剂完成的印模

Fig 11-4　The altered cast impression.(a) The framework with close-fitting saddles has been seated and pressure applied over the saddles. The resulting displacement of the saddles has resulted in the connector lifting away from the lingual surfaces of the anterior teeth. If this displacement does not occur and the saddle extensions are acceptable, an altered cast impression is not required.(b) Modification with green stick compound in the posterior lingual area, (c) The completed impression using zinc-oxide/eugenol impression paste

在口内重新复位以确定支架完全就位。

of the framework supported by the teeth and no pressure should be applied directly to the saddles. This additionally ensures that the framework is fully seated, and remains seated when the impression is made. Excess impression material should be trimmed away from the completed impression and

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the impression re-seated in the mouth to confirm that the framework was fully seated.

应用改良模型印模来调整工作模型，然后在调整的工作模型上完成义齿的制作（图11-5）。改良模型印模技术除了理论优势以外，在实际操作中它允许更有控制地同时记录义齿延伸区和承托区，而这很难通过常规工作印模方法办到。或许正是这种实践操作而不是理论上的优势，使得游离端鞍基稳定性的提高毫无疑问地与改良模型印模技术的应用联系在一起了。

The altered cast impression is used to modify the working cast and the fabrication of the denture is then completed on this modified cast (Fig 11-5). Besides the theoretical benefit of the altered cast technique, the important practical advantage is that it allows for a more controlled recording of both the denture extension and baring area that is often difficult to achieve with the forms of working impression. It is perhaps this practical rather than the theoretical advantage that results in the improved stability of free-end saddles that is undoubtedly associated with the use of the altered cast technique.

常见错误

- 使用了过多印模材料导致颊侧延伸过度。

Common errors

- Buccal overextension and use of too much impression material.

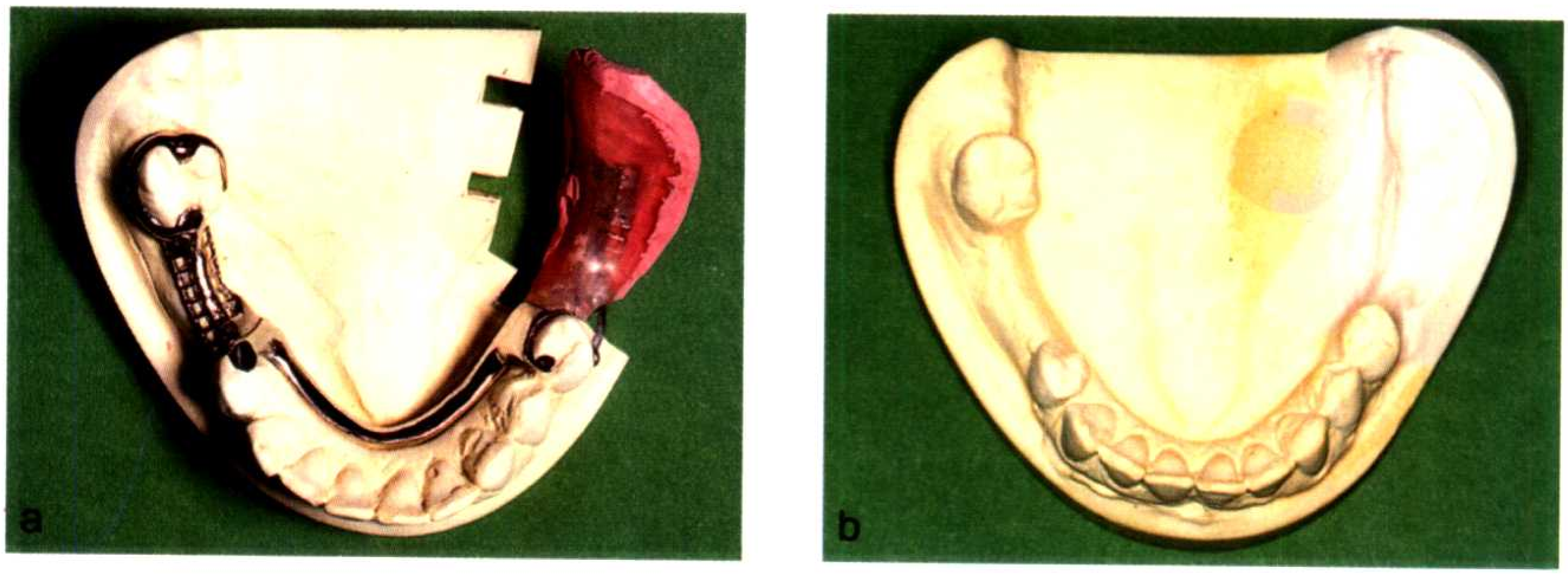


图 11-5 用改良模型印模法制取的印模来矫正工作模型

Fig 11-5 (a,b) Modification of the working cast with the altered cast impression

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- 当记录印模时支架没有完全就位。

最终的记录

本步骤的目的是：
- 记录可摘局部义齿最终的颌位关系
- 选择人工牙的颜色和形态

颌位关系记录应该早在检查患者以及对研究模型上𬌗架时就已经确定，最终的颌位记录只是允许工作模型连同支架重复这一关系（图 11-6）。和初次颌位记录一样，对大多数患者而言，颌位关系记录的是一个现存的牙尖交错位。如果只有少数牙缺失，就可以采用“手动对咬合”带有支架的工作模型，而不需要最终的颌位记录。更常见的情况是，需要采用蜡𬌗堤来确保一个稳定的最终记录。如果不能通过任何对颌牙和桥基牙来获得信息，那么这些蜡𬌗堤需要修整成可以清楚地

- Framework not fully seated when recording impression.

Definitive Registration

The objectives of this stage are to:
- record the definitive jaw relationships for the partial denture
- select the shade and mould of replacement teeth.

The jaw relationship record should have been previously determined from the examination of the patient and the articulated study casts and the definitive registration simply allows the articulation of the working cast and framework to this relationship (Fig 11-6). As with the preliminary registration, for the vast majority of patients the jaw relationship record will be an existing intercuspal position. If only a few teeth are missing, it may be possible to “hand articulate” accurately the working casts with frameworks without the need for a defini-



图 11-6 反映牙尖交错位的最终颌位关系记录，体现了正常的牙对牙接触，并确保义齿的各个部件，诸如支托和卡环臂等没有干扰这种咬合关系

Fig 11-6 A definitive registration recording the intercuspal position as the reference. Normal tooth-to-tooth contacts are present and care has been taken to ensure that denture components such as rests and clasp arms do not interfere with this relationship

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指示缺失牙殆平面方向和颊舌向位置的形状。

tive registration record. More often, addition of wax occlusal rims is necessary to ensure a stable definitive registration. These rims should be trimmed to indicate the required orientation of occlusal planes and buccolingual positions of replacement teeth if this is not clearly indicated by any standing opposing and abutment teeth.

当可摘局部义齿设计用来矫正由于牙齿磨耗或者缺乏咬合支撑导致的咬合过紧时，就需要确定殆面高度。新的殆面高度，以及牙对牙的关系，应该建立在上好殆架上的研究模型上。当上下牙弓均有牙时，参考息止颌面高度和息止颌间隙没有什么作用，但对于一侧牙弓为全口义齿修复时，该法显然是有用的。

The determination of occlusal face height is required when the partial denture is planned to correct overclosure resulting from tooth wear or the lack of occlusal stops. The new occlusal face height should have been established on the articulated study casts together with tooth-to-tooth relationships at the new height. Reference to the resting face height and freeway space is rarely of practical use -when both arches are dentate but is clearly of value when an opposing arch is to be restored with a complete denture.

人工牙形状的选择并非必须，因为余留的天然牙会提供给技师必要的信息。人工牙颜色的选择倒存在一定的问题，对每一个缺失牙都可能需要根据相邻桥基牙的颜色来进行匹配。

Selection of tooth mould is frequently not necessary as remaining natural teeth will provide the technician with the necessary information. Shade selection can be problematic and may need to vary with individual replacement teeth to match adjacent standing teeth.

这一操作过程中常犯的错误与前面第8章中描述的"初次颌位记录"所遇到的问题本质上是相似的。

Common errors for this stage are essentially similar to those described for the preliminary registration in Chapter 8.

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可摘局部义齿的试戴

这一步骤的目的是确定人工牙的排列是否恢复了正确的殆关系以及能否为患者提供一个满意的外观。

由于大多数可摘局部义齿的殆关系设计符合或增强了现存的牙尖交错位，因而可以通过目测，或者通过与对颌天然牙之间正常的薄垫片接触来确保颌位关系的准确性。通常不必要使用咬合纸来确定与对颌人工牙之间充足的牙尖接触关系，因为这样可能引起试排牙时蜡基托上的人工牙脱落。微小的殆关系错误是可以接受的，因为将完成的义齿放入口内后，通过简单的调磨就可以加以修改。如果存在明显的干扰则需要重新记录颌位关系。

必须确保患者对戴入口中的义齿外观满意。尽管正确的人工牙排列、型号和颜色对于满意的外观是必要的，但牙龈边缘和基托边缘的外形也具有重要意义。一般情况下，蜡龈缘的水平应该参照天然牙的龈缘水平，基托的外形应该是光滑的曲线，不应该存在突兀的直线（图 11-7）。

Partial Denture Try-in

The objective of this stage is to confirm that the arrangement of the replacement teeth restores the correct occlusion and gives a pleasing appearance.

As the majority of partial denture occlusions are designed to conform with and reinforce an existing intercuspal position, the accuracy of the jaw relationships can be established visually and by ensuring normal shimstock contact between opposing natural teeth. Use of articulating paper to confirm the adequate intercuspation of opposing denture teeth is not normally necessary and carries the risk of displacing denture teeth in the supporting wax of the trial set-up. Minor occlusal errors maybe accepted on the assumption that the necessary adjustments can more easily be accomplished when the processed dentures are inserted. Obvious occlusal discrepancies will require a new jaw relation record.

The patient's acceptance of the appearance of the denture in the mouth must be confirmed. Although the correct arrangement, size and colour of the replacement teeth are clearly necessary for a pleasing appearance, the contours of the gingival margins and flanges are as important. In general, the level of the waxed gingival margins should follow that of the natural teeth and the outline of the flanges should

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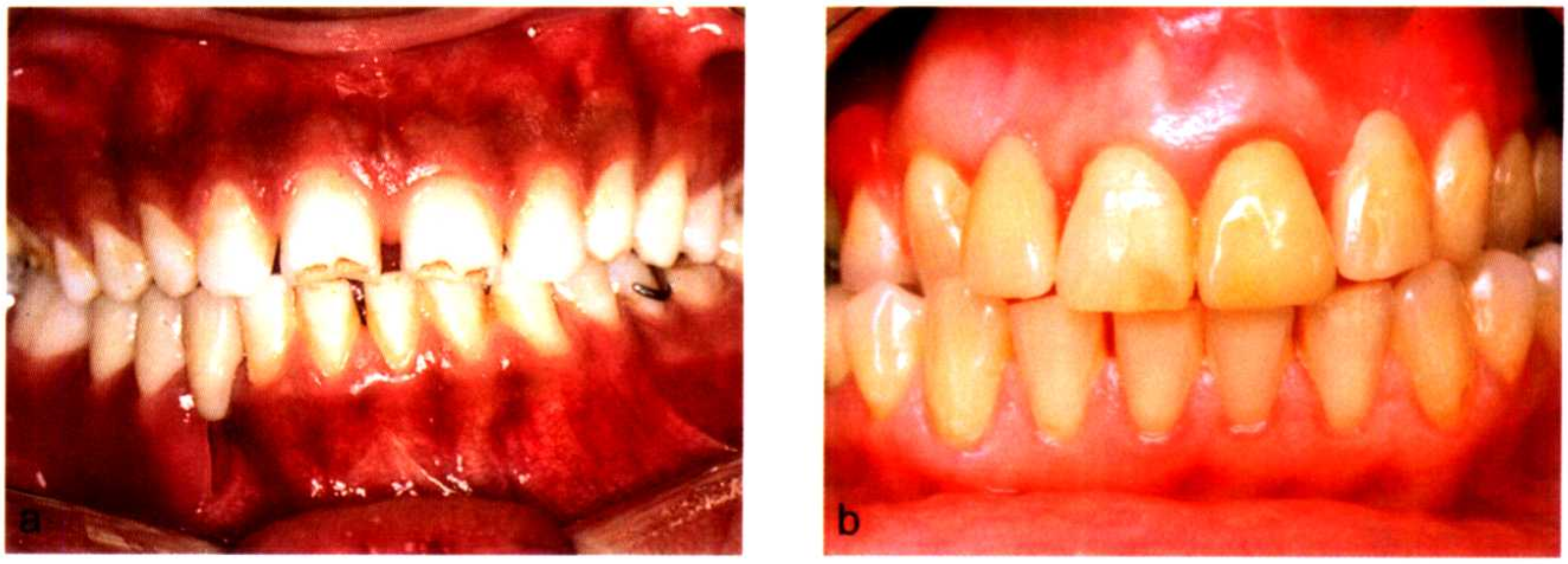


图 11-7 试戴步骤。a. 表现出正常的牙尖交错，人工牙的外观令人满意；b. 修复 2|2 时选择不同的颜色使之与邻牙更好地匹配，左侧颊基托的外形与软组织弯曲一致，而 4| 牙冠太短，看起来明显是人工牙

Fig 11-7 Try-in stage, (a) Normal intercuspal contacts are present and the appearance of the replacement teeth is satisfactory, (b) Selection of differing shades for the replacement UR2 and UL2 teeth has resulted in a good match with adjacent teeth. The contour of the left buccal flange blends in well with the soft tissues. The same cannot be said of the replacement UR4 that is too short and looks obviously artificial

在对义齿完成直接充胶之前的试排牙过程中，任何调改都应该很小。如果改变了颌位记录或者人工牙的颜色和（或）外形，就要进行第二次试戴加以确认。

常见错误

- 对𬌗关系不够充分关注。
- 人工牙的牙冠长度太短。这种情况常见于前磨牙区，短牙冠和矮“龈缘”使义齿呈人工牙外观，尤其是在相邻尖牙的衬托下更加明显。

follow smooth curves and not end abruptly as straight lines (Fig 11-7).

Any modifications of the set-up prescribed before proceeding directly to processing of the denture should be of a minor nature. Alterations to the setup following re-registration of jaw relationships or a change of tooth mould and/or shade to improve appearance should be confirmed at a second try-in stage.

Common errors

- Insufficient attention to occlusion.
- The crown length of replacement teeth is too short. This is often seen in the premolar region where a short crown and a low “gingival margin” make denture teeth stand out as artificial, in par-

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ticular when abutting against a standing canine tooth.

可摘局部义齿的戴入

本步骤的目的在于：

- 检查完成后义齿的密合性、殆关系以及外观，并加以必要调改。
- 指导患者正确地摘戴义齿。
- 指导患者正确地保养义齿，并再次强调对余留天然牙齿的持续保健。

在戴入义齿前，检查丙烯酸树脂的组织面、边缘和磨光面，确保充分抛光，没有突出的结节或者锋利的边缘。制作良好和令人失望的可摘局部义齿见图 11-8，后者的失败源自于在整个义齿制作过程之中对细节缺乏关注。

为了保证义齿能够充分就位，需要对树脂基托（而不是金属支架）进行微小调改。同时对殆关系进行必要的调改，以确保在侧方及前伸运动时对颌天然牙和（或）人工牙之间有正确的牙尖接触。

应该向患者演示并使其实践正确的义齿摘戴方法，此外，应向患者宣教

Partial Denture Insert

The objectives of this stage are to:

- check the fit, occlusion and appearance of the completed dentures and to adjust where necessary
- instruct the patient in the correct seating and removal of the dentures
- advise the patient on the proper care of their dentures and to re-emphasise the continued care of the natural teeth.

Before inserting the dentures, check the fitting surface, borders and polished surfaces of the processed acrylic to ensure that there are no projecting nodules or sharp edges and that they have been adequately finished. For examples of good and disappointing completed partial dentures see Fig 11-8. The latter is normally the cumulative result of a lack of care and attention to detail throughout the process of denture construction.

Small adjustments of the saddle acrylic (and not the metal framework) may be needed to ensure that the dentures seat fully. Adjust the occlusion as necessary to ensure the correct contact of opposing natural and/or replacement teeth on intercuspation and in lateral and protrusive movements.

The patient should be shown, and have practised, the correct way to take out and

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图 11-8 可摘局部义齿的戴入步骤。a. 人工牙排列仔细，唇侧基托的轮廓和外形呈现出良好的美观效果，并且保持了正确的牙尖接触关系；b. 对卡环、人工牙和殆关系的细节缺乏重视，导致义齿令人失望；c. 没有重现对刃前牙之间的正常牙尖接触，需要进一步的殆调整；d. 基托在颊系带处伸展过度

Fig 11-8 Partial denture insert stage, (a) Care in the arrangement of the replacement teeth and the outline and contouring of the labial flange has produced a good aesthetic result. Normal intercuspal contacts have been maintained, (b) Lack of attention to the detail of clasp design, replacement teeth and occlusion has resulted in a disappointing outcome, (c) Normal intercuspal contacts between opposing anterior teeth have not been reproduced. Further occlusal adjustment is necessary, (d) Flange overextension in relation to the buccal fraenum

如何正确使用和维护义齿以及余留天然牙。需要强调良好的菌斑控制，在必要时，应向患者推荐和演示其他的辅助清洁措施，如牙线、间隙刷、菌斑显示剂等。在接下来的一周内要安排一次复诊。

insert their dentures. In addition, the patient must be instructed in the use and care of their denture and natural teeth. The need for good plaque control should be emphasised and, where necessary, additional cleaning aids, such as floss, interspace brushes and disclosing tablets

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should be recommended and their use demonstrated. A review appointment should be made for the following week.

常见错误

- 对殆关系关注不够（图 11-8c）。应该采用薄垫片来验证正常的牙尖接触，义齿在侧方和前伸运动中应该保持稳定，并且这些运动应该是平滑地沿着现有的导平面进行。
- 义齿边缘延伸过度，导致义齿在功能状态下的移位（图 11-8d）。

Common errors

- Insufficient attention paid to the occlusion (Fig11-8c). Normal intercuspal contacts should be verified with shimstock. The denture should remain stable through lateral and protrusive excursive movements which should be smooth and follow the existing tooth guidance where appropriate.
- Denture flange over extension resulting in displacement of the denture in function (Fig 11-8d).

复诊和维护

本步骤的目的在于：

- 确定并纠正可能导致患者不适的任何义齿殆关系和贴合问题
- 检查并强化患者的口腔和义齿卫生
- 确保义齿功能的长期维持

在复诊时，无论患者抱怨与否，都应该检查口内与义齿相关的损伤体征。不舒服通常来自于过紧的支架、或者是鞍基贴合和（或）伸展不当，导致在牙齿和软组织上的压力过大。应选用合适的指示剂来确定需要调改的区域。牙齿和软组织上的过大压力也可能来

Review and Maintenance

The objectives of this stage are to:

- identify and correct any errors of occlusion or of fit which may have caused discomfort
- check and reinforce the patient's oral and denture hygiene
- ensure the continued maintenance of denture function.

At the review, the mouth should be examined for signs of denture-related injury whether or not the patient complains of discomfort. Discomfort commonly results from excessive pressure applied to teeth and the soft tissues from a tight fitting framework or errors in the fit and/or extension

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自于𬌗关系错误，在缓冲义齿压痛区之前，总是应该首先检查𬌗关系。如果必须做调改，则通常应该再安排一次随诊。

of the saddles, respectively. The areas requiring adjustment should be identified with suitable disclosing media. Excessive pressures on both teeth and soft tissues may also result from occlusal errors, and the occlusion should always be checked before the denture is relieved over sore areas. Where adjustments have been necessary, a further review should normally be arranged.

如果有必要的话，应该检查并强化患者的口腔和义齿卫生情况，包括邻近义齿或被义齿覆盖的区域，尤其是桥基牙。可能需要指导患者使用额外的口腔卫生辅助用品，如牙线（Oral–B）和单簇毛刷（图 11-9）。

The patient's oral and denture hygiene should be checked and, if necessary, reinforced. Areas of concern are those covered by and abutting the denture and, in particular, abutment teeth. Instruction in the use of additional oral hygiene aids such as Super Foss (Oral-B) and single tufted brushes may be required (Fig 11-9).

可摘局部义齿的长期功能可能会受到诸如义齿组件的变形和最终折断、人工牙的折裂和磨损，以及无牙区牙

The long-term function of a partial denture will be compromised by the deformation and eventual fracture of denture





图 11-9 口腔和义齿的卫生。a. 在基牙的邻面使用 Oral – B 牙线；b. 用单簇毛刷来清洁义齿支架的复杂部分

Fig 11-9 Oral and denture hygiene, (a) Use of Super Floss (Oral-B) on the proximal surface of an abutment tooth, (b) A single tufted brush for cleaning intricate areas of the denture framework

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槽嵴的持续吸收等影响，因此通常需要对卡环进行调改和修复，对折裂的人工牙进行修补。对游离端鞍基义齿而言，由于牙槽嵴持续性骨吸收导致的义齿组织面不适合是一个重要的特点，因而如果义齿不稳定性增加时，可以通过简单的重衬加以矫正。重衬印模应该在义齿没有殆接触的情况下制取，但要对支架施加稳定的力量以确保其充分的就位。由于这种维护对于可摘局部义齿继续行使满意的功能很重要，我们必须牢记：可摘局部义齿的长期成功取决于在义齿创建之前建立一个健康的口腔环境，以及一旦适应义齿以后，对口腔健康的维护。

components, by denture tooth fracture and wear and by the continued resorption of the edentulous ridge. Adjustments and repairs to clasps and the repair of fractured denture teeth are commonly required. Deterioration in the fit of a partial denture resulting from continued bone resorption is a particular feature of free-end saddle dentures and is corrected by simple reline procedures when increasing instability is noted. Reline impressions should be recorded with the denture out of occlusion but with firm pressure applied to the framework to ensure its proper seating. Important as this maintenance is to the continued satisfactory function of a partial denture, it should always be remembered that the long-term success of a partial denture will be determined by the success in establishing a healthy oral environment prior to denture construction, and to the maintenance of oral health once the denture has been fitted.

重　点

制作可摘局部义齿的整个临床过程都必须注意细节，尤其应包括下述各点：

- 良好设计的个别托盘便于获得精确的工作印模。
- 改良模型印模法提高了下颌游离端义齿鞍基的密合性和稳定

Key Points

Care and attention to detail at all clinical stages in the construction of partial dentures are necessary. In particular, this includes the following:

- Well-designed custom impression trays to facilitate accurate working impressions.
- An altered cast impression to improve the fit and stability of lower free-end

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性。

- 在每个临床操作都对𬌗关系予以充分注意。
- 选择合适颜色和型号的人工牙。
- 留意相关丙烯酸树脂基托的形状和外形。

denture saddles.

- Attention to the occlusion at all clinical stages.
- Selection of the appropriate shade and size of replacement teeth.
- Care in the shaping and contouring of associated acrylic flanges.

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